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Third Semi-Annual Meeting of the American Gas-Light Association,

AT WASHINGTON, D. C., MAY 12, 1875.

The Association met, pursuant to resolution at last meeting, Mr. W. H. Price, of Cleveland, First Vice-President, in the chair.

There were present about seventy-five members.

The reading of the minutes of the previous meeting was dispensed with.

The following gentlemen applied for admission as active members of the association, and were duly elected.

Charles W. Isbell, New York City.
L. G, McCauley, West Chester, Pa.
Charles A. Gerdenier, Bridgeport, Con.
L. P. Gerould, Newton, Mass.
H. H. Fish, Utica, N. Y.
F. H. Odiorne, Rockland, Maine.
Isaac R. Scott, Waltham, Mass.
I. N. Stanley, Brooklyn, N. Y.
John McIlhenny, Columbus, Ga.
Hugh McLean, Macon, Ga.
Oliver McIlhenny, Montgomery, Ala.
B. Rankin, Louisville, Ky.
E. S. Funnell, Albany, N. Y.
Albert D. Perry, Portsmouth, Va.
Samuel Prichitt, Nashville, Tenn.
A. G. Guerard, Savannah, Ga.
William Gardner, Pittsburg, Pa.
Charles Nash, Williamsport, Pa.
W. H. Bradley, Brooklyn, N. Y.
George K. Reed, Lancaster, Pa.

ADDRESS OF THE PRESIDING OFFICER.

Mr. Price then addressed the meeting as follows:

Gentlemen: I perceive that the fourth item in the order of exercises is an address by the President. That address of course you cannot have. Your President is absent. As one year ago it was my misfortune to be called upon by virtue of my position to preside over your deliberations, I find myself to-day in the same position, most unexpectedly to myself. I had no intimation before coming here that General Roome would not be present. I have still the dust of travel upon me. I have not had one moment of leisure to prepare a single thought to lay before you in connection with our exercises, and the performance of our duty here or elsewhere.

I am very happy to see so large and so intelligent a representation of the gas interests of the country, as we have in this room at this moment. I perceive that a large number have come from New England, and they are also coming in from the South, and our list will now show, not a complete, but a very full representation of the gas interests of the United States.

When we laid the foundation of this association, some two years ago, in the city of New York, it was a very small beginning. It was with a great deal of misgiving and a great deal of doubt on the part of many, in the first place, whether it was expedient; and in the next place whether it could be made to succeed. Some of us had faith. We believed it expedient, and had faith that it could be made to succeed; and I think that the large assemblage of delegates whom we have before us to-day from the gas companies of the country, indicates that we have made very great progress in the period since our first organization.

I think there is everything to encourage us to go forward and make this a permanent institution, if I may so call it—a permanent gas association, having always in view the fundamental purpose for which it was organized—*mutual improvement in the art of manufacturing and distributing gas*, as well as in the performance of the various other duties connected with the conducting of our business.

I suppose, gentlemen, there has never been a time in the history of this country when there has been as much agitation on the subject of gas light, and the method of obtaining cheap gas light as at the present moment. I think this is fully due to the fact that the times are considered somewhat hard, and gas bills are bearing somewhat severely upon consumers in our different cities and towns. I presume the experience of every man managing a gas company at this moment is that there are an unusual number of complaints, and that there has been during the last winter particularly, an unusually large number, in regard to the size of the bills.

This does not grow out of the fact that the bills are any larger than they have been heretofore, but I think it is from the fact that it is more difficult to pay bills—more difficult for the consumer to raise the money, and he feels the bill more than he felt it some years ago, and makes more complaint.

In every direction we hear the cry, "Give us cheaper gas." Of course attending this are numerous efforts to start new companies, and the people of many cities are inclined to believe that the way to get cheap gas is to get up an opposition company in the city in which the gas is desired to be cheaper.

I shall not enter into a discussion of this question, and will only say that I think the public attention is now aroused more to the importance of having cheap gas than ever before, and that here comes in one of the necessities of our organization: that we may learn what is the best material to use, what are the best methods of manipulating that material, and how we can, in the first place, produce our gas cheaply, and in the next place ascertain the best method of conducting our business so that we may sell it cheaply, and so that the people may really have better light in their homes and streets than they ever had before and have it at the lowest possible rates.

These are really the purposes of our organization. I hope we shall bear those purposes in mind, and make every movement in this convention—every motion—every speech—every remark—to bear upon these points.

The association is now open for business.

Petroleum and Natural Gas in Ohio.

The Pittsburgh *Commercial* says: From Mr. Richard Carter, of 232 Liberty street, this city, we learn the particulars of a discovery of petroleum and natural gas at Sciotoville, Ohio, on the grounds of the Scioto Fire Brick Company. It seems that in January, 1820, two men, John Brown, Sr., and David Jones, bought a strip of 12 acres of land on the bank of the Ohio River, near the site of the present village of Sciotoville. Mr. Jones was a practical man, and it occurred to him that on this land salt water might be found. He commenced digging a well, with the appliances of that day, and after sinking it to a depth of 75 feet, walled it with sawed trunks of hollow sycamore, and then by the slow and laborious process of that time, he drilled to the depth of 350 feet, tubing with tin and wood tubes of about two and one-half to three inches in diameter. He struck salt water, said to be so strong that a spoonful of salt would be insoluble in a pint of water, but the flow was weak, and was hindered by a strong flow of petroleum and a steady press of gas. Not knowing the value of his discovery, and being financially unable to prospect further, he abandoned the well, closing the tubing with a heavy pine plug, nearly three inches in diameter. The pressure of the gas was so strong, that a half-inch hole was made through the plug, so it could be driven in, and then a smaller plug driven in that. Moving on his farm, he set to work to earn means to continue boring his well, but before he could do so he sickened and died, salt dropped down to 15 cents per bushel, and his heirs never took the unfinished work that he had abandoned.

The oil and gas bubbled up, but nobody knew their value, and the well attracted no attention further than that the petroleum was used by the natives to rub on their sprained, bruised or rheumatic limbs, and both petroleum and gas were fired by wondering groups of men and boys as they bubbled up on the Ohio River, which, in the years since 1820, had cut away the bank and spread its waters over the well. The uninformed wondered what manner of thing this was that ignited at the touch of a match, and was carried on by the waters, an island of flame.

But it is now turned to account. The land changed hands until the Scioto Fire Brick Company came into possession of it, in 1872, and the president of the

company, Mr. W. Q. Adams, concluded recently to reopen the well, and did so, and when the end of the tubing was reached and the plug removed, petroleum flowed faster than a man could bail it out with a bucket, while the pressure of gas was very strong. A long iron tube was lowered and loosely inserted in the tubing, and when a match was applied at the top of the iron pipe, the gas was ignited and burned with a steady flame, while a piece of burning paper was communicated to the oil on the water, and the whole surface was soon ablaze.

With such favorable indications the company at once set about to utilize this gas, and as the old well is only about twenty feet above low water mark, the idea of using the well was abandoned, and the company began digging a well on the bank near their lower brickyard, and have reached the rock, engaged a practical well digger, are preparing their derrick, and will begin boring as soon as the river opens, using the power from their engine in the works.

If the company find gas, as no doubt they will, it will enable them to run their entire works with gas, light the works and store, and make an immense saving in the way of fuel.

Should the old well be utilized, as it can be done, the flow of petroleum may be such as to make the village of Sciotoville one of the most important in Southern Ohio. It has extensive coal fields within 12 miles of the corporate limits · rich beds of ore as near; the best fire clay within a stone's throw of the place, and if it has petroleum and gas hidden under its walks and avenues, the broad sweeping river on its south, and a railroad running through it, it will widen its borders, extend its domains, dot its squares with iron works, its hills with furnaces and its valleys with derricks.

Economic Use of Fuel.

The following interesting summary is from an address recently delivered before the Royal School of Mines, at Berlin, by G. F. Becker. The progress in the economical consumption of fuel in the last fifty years has been enormous, and has been effected in great part by metallurgists; and here again we find the scientific men taking the lead. In the economical application of the heat developed by fuel, the Bessemer process is enormously effective, not more than ten pounds of coal being requisite for the production of a hundred weight of steel from pig iron by this method, while in the older process, still in use for fine qualities of steel, two hundred and fifty pounds are needed. Siemens, by making the heat which would escape through the chimney of an ordinary furnace warm the fuel and the air necessary to combustion, obtains an economy of two-thirds the weight of fuel. It was Faber du Faure, an accomplished Bavarian metallurgist, who first made practical use of the gases which formerly escaped in immense quantities from the tops of blast furnaces and the enormous blast engines, the hoisting engines, pumps and hot blast stoves, even the roasting kilns of such establishments now-a-days require no fuel except this long-neglected waste product. Bischof, another German engineer and metallurgical author was the first to produce gas artificially for smelting purposes, and this was certainly one of the greatest advances ever made in our art. By first turning it into gas, fuel can be much more perfectly consumed than in the solid form, and hence can be made to give us, as in the Siemens furnace, in which only gas is used, a much higher temperature than is practically attained by the combustion of coal in the ordinary way, but perhaps the greatest advantage of gas is that substances, in general scarcely regarded as fuel at all, can be employed for the production of gas with the most brilliant results, a matter of the greatest importance, especially in a region destitute of true coal, like California. Lundin, a noted and thoroughly educated Swedish metallurgist, has taught us how to produce gas from wet sawdust, entirely without preparation, of such power that wrought iron may be melted with it, and the great difficulty is to find any material infusible enough to answer as a lining in the furnaces where it is consumed. You will receive some idea of the importance of these improvements from the fact that the economy in fuel effected in England alone in the year 1872, as compared with 1871, by the progress made in the introduction of more perfect apparatus, represented more than four millions of tons of coal.

Contaminated Drinking Water and Typhoid Fever.

Dr. Haegler, of Basle, gives the details of an outbreak of typhoid fever in the village of Lausen, near Basle, where the ordinary conditions that have been said to govern the disease, such as the character of the subsoil and subsoil water, were extremely unfavorable for the development of the disease, and where in fact, for a long time there had been no typhoid. In August fifty-seven cases occurred within a space of nine days, and in all the houses of the village except six, while these six drew their water supply from a source entirely different from the others. On investigation it was learned that two months previously there had been cases of typhoid in a farm house not far from the village, and that the dejections of the patients had been thrown into a little stream running through the yard, or into a ditch communicating with it; this stream joined the larger one that supplied the village. Other excrementitious matter had also been thrown upon dung heaps, from which a drain led to the same stream. Dr. Haegler concluded from these facts:

1. That the epidemic of typhoid fever in this instance was the result of drinking water contaminated with the dejections of typhoid patients.

2. He believes that typhoid fever depends upon a specific poison obtained from typhoid patients. Other putrid matter and decomposing organic substances, and at any rate, the filth of privies and dung heaps, with which the typhoid dejections may be mingled, cannot produce the disease, since this instance shows that the drinking water of the town had been fouled by these substances for years without producing any bad result.

3. The ordinary filtration of contaminated water by its passage through the ground, will not disinfect the water or furnish any protection against the action of the typhoid poison.—*Jour. of Applied Chemistry.*

Pollution of Rivers in Scotland.

A meeting was held at the Royal Society's Rooms, Edinburgh, some months ago, to consider the propriety of forming an association for the preservation of the rivers and lochs of Scotland from pollution. A correspondent—described as "peculiarly well-informed and capable"—of one of the local newspapers furnishes some information as to the extent to which this contaminating process is carried on. He thinks, by way of preface, that it is in vain to expect a cure for the evil from the mill-owners and manufacturers unless they are compelled to adopt means for purifying their refuse liquors before pouring them into the rivers. He complains that many of the once "crystal streams" have been turned into "fetid sewers," and mentions, as examples, the Devon, Avon, Carron, and Fifeshire Leven; and in the district of the Tay, the Almond, Dighty and Ericht; the South Esk; in Ayrshire, the Irvine, Ayr, Doon and Garnock, the Kelvin, Clyde and Leven (Loch Lomond); the Nith; and in the Tweed district, the Gala, Jed, Teviot, and Whitadder. On the banks of the Tweed and its tributaries alone, we are told there are at present 100 mills and manufactories; and in not above one in ten is there the slightest attempt made to purify the poisonous liquids before they are discharged into the river. Having dwelt on "the inefficient and unworkable pollution clauses" in Scotch Acts, the writer advocates strongly the claims of "riparian owners," and hopes Parliament may be induced to pass an Act compelling the purification of rivers.

Chemical Repertory.

No. 132.—May 17, 1875.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

1416. Purification of the Seine.—We learn from Paris that a commission which was some time ago appointed by the government to inquire into the best means of getting rid of the sewage of the city without polluting the Seine, has made a report of a very decisive character. The committee proposes that the whole of the sewage shall be distributed by means of machinery over a plain many thousand acres in extent. The value of this land, on which fruit and vegetables are produced for the Paris market, will, it is calculated, be thereby increased tenfold. At the same time no deleterious effects will result, the porous nature of the ground being specially favorable to the operation proposed.—*Iron.*

1417. New Property of Glycerine.—R. Godefroy, on examining a chemically pure glycerine from the Apollo Japan Works in Vienna, found that when heated to 150° it took fire and burnt with a steady, blue, non-luminous flame, without diffusing any odor or leaving a residue. The glycerine had the specific gravity 1·9609. This property enables glycerine of lower specific gravity to be burnt by means of a lamp-wick.—*German Chemical Society.*

1418. The Water Supply of London.—Dr. Frankland reports that the water drawn from the Thames during March, and supplied by the metropolitan companies was "in a very impure condition;" that delivered by the Chelsea, Southwark, Grand Junction, and Lambeth companies was "slightly turbid, and contained moving organisms." The West Middlesex was the only company that supplied efficiently filtered Thames water at the time when the samples were drawn. The Lea water furnished by the New River and East London companies was of improved quality, and was efficiently filtered. The Kent Company's water, derived from deep wells in the chalk, was of the usual excellent quality.

1419. Explosion in an Aniline Factory.—The celebrated aniline works of Poirrier, near Paris, was recently the scene of a terrific explosion, which killed two men, dangerously wounded two others, and inflicted damage to the extent of $80,000. The immediate cause was the introduction, against positive orders, of a lighted lamp into a store room containing nitrate of methyl, a chemical lately extensively used instead of iodide of methyl in the manufacture of methyl green. The liquid, on being poured from a tank, took fire, and the heat communicating to other packages containing nitrate of methyl, the latter exploded with tremendous force. The explosive property of nitrate of methyl seems not to have been suspected before.

[This last statement is incorrect. It is now several years since a distinguished English chemist, E. T. Chapman, lost his life through the explosion of nitrate of methylene.—Ed.]

1420. Ammonia of the Atmosphere.—M. A. Scelœsing.—The author shows that in the transformations of organized beings a certain quantity of nitrogen leaves the combined state and is set free, so that the total sum of azotized compounds existing in the world would suffer continual diminution if there were no restoratory process. Such a process has been placed alternately in the atmosphere, in plants, and in soils. The action of the last being doubtful, and that of the second no longer admitted, atmospheric electricity seems to be the sole restorative process which is definitely established. The author proposes to examine whether the quantity of combined nitrogen brought down by rain is really sufficient to main-

tain the equilibrium. The sea serves as an immense reservoir of combined ammonia.—*Acad. Sciences.*

1421. Wooden Pavements.—A writer in *Popular Science Monthly*, who apparently knows whereof he speaks, states as follows :

"An investment of about $5 000,000, a sum far in excess of that in any other city of the globe, has been made in Washington, D. C., within little more than three years, in wooden pavements, nearly all treated with chemicals to prevent decomposition. Many of them are now in an advanced stage of decay, and, from the degree of preservation after two or three years' use on suburban streets, with hardly any wear, one cannot approve of any of the processes applied, since none of them has effectively neutralized the destructive local agencies, or made up for inferiority in the quality of the lumber used."

1422. Atlantic Icebergs.—Mr. George J. Symons writes from Paris, April 2: At Friday morning's sittings of the Physical Section of the Reunion des Societes Savantes, M. Michel threw out a suggestion which appears to me likely to, or at any rate possibly may, be the means of averting the principal source of danger in crossing the Atlantic. I refer, of course, to icebergs in foggy weather and the total wrecks which occur from running on to them. It is well known that the proximity of icebergs is indicated by a diminution in the temperature of the sea. M. Michel's proposal is very simple; it is merely that Transatlantic steamers should carry a submerged electric thermometer, which might easily be arranged to ring a bell in any part of the vessel on the occurrence of whatever change of temperature might be decided upon."

1423. An Apparatus for Preventing the Freezing of Water.—The bursting of water pipes is prevented by means of an apparatus made by Whitley Partners, of Leeds. A box of thin sheet copper is placed outside the building whose pipe is to be protected, filled with water and exposed to the freezing point in the open air. The moment the water freezes the expansion of the box exercises a pressure, and opens the valve attached to it, which causes the main pipe to open and discharge its contents. The water in motion produces a counter pressure and closes the valve, thus restoring it to its functions. The apparatus is made under three species of modifications; one applicable to buildings furnished with cisterns, and two where there is direct pressure.

1424. Manufacture of Alizarine.—The manufacture of alizarine has hitherto been checked for want of the raw material, since anthracene, which is converted first into anthrachinone and then into alizarine, is found only to a small extent in coal-tar. There is now a prospect of obtaining the raw material in quantity. Phthalic acid, $C_8H_4O_6$, is produced by oxidizing naphthaline. Benzole $C_{12}H_6$, is well known to be an abundant constituent of coal-tar. If the chlorine compound of phthalic acid, $C_8H_4O_4Cl_2$, is heated for twelve hours with benzole to 220° C. in a closed vessel, anthrachinone is obtained, according to the following reaction :

$$\underbrace{C_8H_4O_4Cl_2}_{\text{Phthalic Chloride.}} + \underbrace{C_{12}H_6}_{\text{Benzole.}} = \underbrace{C_{20}H_8O_4}_{\text{Anthrachinone.}} + \underbrace{2HCl}_{\text{Hydrochloric Acid.}}$$

This process is proposed by Piccard, and will, it is hoped, soon be introduced into practice.

1423. Strange Phenomena.—March 4, 1875, Mr. Braham exhibited the following to the *London Chemical Society :*

He exhausted a glass receiver, and, after allowing the air to re-enter through a large opening until equilibrium was restored, he closed the opening, and connected the vessel with a pressure gauge. In the course of a minute the mercury now rose one inch. A converse experiment was made by pumping air into a glass vessel, allowing it to escape, and then closing the opening. In a short time there was an appreciable pressure again within the vessel. The assembled chemists offered differing modes of explanation of these phenomena, proving them to be in need of investigation, to prove which was true.

1426. German Coal Industry.—The suggestion has been mooted that the ports on the river Ems may be turned to good account, for as from 400 to 500 vessels sail during the course of the year from Emden, Papenburg, and Leer, to Kœnigsberg and the adjacent ports for wood, and as these vessels are obliged to carry large quantities of ballast on the outward journey, the question is asked why cannot these vessels be laden with coal outwards, as they could carry such at very low freights? The decision of the Hamburg Gas Association to make experiments on a large scale with Westphalia coal, has given increased impetus to the movement, and has already led to some very sanguine expectations. It is further stated that the deliveries of Westphalian coal to Hamburg have greatly increased, and that there is every reason to surmise that a capital market will be opened up in Hamburg, not only as far as producers are concerned, but that consumers will be able to obtain coals on lower terms than hitherto. One of the leading Hamburg firms is receiving the output of eight of the principal Westphalian pits, and thinks itself in a position to supply almost any quantity that may be demanded. A petition is also being prepared, praying the Bavarian government to bore for coal in Upper Swabia at the cost of the State, since geologists are confident that important beds of coal might there be discovered.—*Iron.*

Distillation of Coal Tar.

By Dr. Letheby, of London.

Another operation which demands care in its management is the distillation of coal tar for the various products derivable from it. There are two kinds of tar derivable from coal, according as the temperature of distillation is high or low, according to the richness of the coal in hydrocarbon. One is ordinary coal tar, and the other is the tar from which paraffine oils are obtained. The tar produced from common coals at a high temperature (common coal tar) is always heavier than water (sp. gr. 1120 to 1150); it dries freely in the air by oxidation; it contains hydrocarbons with such an excess of carbon that they cannot be burned in a common lamp; it is almost entirely destroyed by strong oil of vitriol; it contains much sulphur, and its per centage composition is about 86 carbon, 7 hydrogen, 6·5 oxygen, and 0·5 sulphur. Whereas the tar produced from cannel coal at a low temperature is lighter than water (sp. gr. about 900); it will not oxidate, or dry in the air; it contains hydrocarbons of the paraffine series, which are comparatively poor in carbon, and which can be burned in a lamp; it is not much acted on by oil of vitriol; it contains little or no sulphur, and its per centage composition is about 84 carbon, 12 hydrogen, and 4 oxygen. Each of these tars is the subject of technical manipulation, which if not properly managed is the cause of nuisance, as are also the processes used in their primary production. In dealing with ordinary coal tar, it is proper that it should be stored and carried in oil-tight tanks, and left covered with a little water. The delivery of it into the tank-barge, or tank-trucks, and from them into the tanks of the works, should be by means of pumps and air-tight flexible hose; and the openings of the barges and tanks should be guarded with a box containing hydrated oxide of iron, as in the case of ammoniacal liquor.

The distillation of coal tar is always conducted in iron stills, set over a naked fire. The stills are of varying capacity, from 1200 to 5000 gallons, and the crown of them is always protected with brickwork to keep them hot, so that the latter volatile products may not cool and condense and fall back into the still. The time of the distillation of a charge is from 12 to 15 hours, according to the capacity of the still; and the products are first condensed in a worm or pipe kept cool in water, and then received into a specially contrived box (varying in form and construction at different places) which permits the several products to flow away by separate pipes (four or five in number, and each provided with a tap) to their several tank receivers. This box is made air-tight, its cover being guarded by a water-valve; and it is provided with an ascending pipe, which carries the foul gases to proper purifiers before they pass into the furnace shaft. The gases which are evolved during the process of distillation are—first, sulphuretted hydrogen from the ammoniacal liquor, which always accompanies the tar; then gaseous or uncondensable hydrocarbons; and, finally, the acrid vapors of the superheated pitch, with an abundance of sulphuretted hydrogen. These gases and vapors should be made to pass, first through a vertical condenser or scrubber charged with a stream of cold water, and then through an oxide of iron purifier with two or three trays of oxide, and finally to the furnace shaft. The necessary draught for these operations should be secured by means of a fan, or by the aid of the furnace shaft. It is proper to mention that, unless there is a draught of considerable power, the unavoidable leakage from the constantly loosening joints of the pipes will not be prevented. It is right, also, to state that it is dangerous to convey these gases and vapors into a furnace fire, as they are explosive when mixed with air, as they necessarily will be.

The products of the distillation of coal tar vary in different places. At one time they were but four, namely: 1. Ammonia liquor and very light naphtha, which come over before the tar in the still begins to boil. 2. A crude naphtha which floats upon water, and is therefore called "light oil." 3. A creosote oil which sinks in water and is called "heavy oil." 4. The residuum, which is a soft pitch. At present, however, in well conducted works, the creosote or dead oil is run off in two portions—namely, an early portion, which is a mixture of creosote and heavy naphthas, which is used for burning in furnaces; and a latter portion, which is best suited for the preservation of timber. This is followed by a greenish oil, which is sometimes collected apart, and redistilled with the anthracene oil that runs from crude pressed anthracene; and then follows a green oil (anthracene oil), which is allowed to flow until it gets very thick from the presence of chrysene. It is in the latter stages of the process, when the high temperature of the still causes the decomposition of the pitch, that sulphuretted hydrogen and acrid vapors are evolved; and this also is the cause of the nuisance from the hot pitch when it is run off from the stills into open pits. To guard against this, it is proper that the fire should be raked out from under the stills directly the process is over, and the pitch should remain in the stills to cool for ten or twelve hours; it should then be run into close receivers, or into a properly constructed chamber, and allowed to cool for 24 hours before it is discharged into the final receiver. All these should be ventilated, so as to convey the vapors through the scrubbers and purifiers before mentioned. An excellent form of receiver for the pitch from the stills is a long air-tight chamber, which will bear internal pressure, and which communicates at the bottom with an outside trough into which the cool pitch is forced by the weight of the hot pitch at each time of its discharge from a still. The pitch when cooled to a temperature of about 180° or 190° Fahr. may be freely exposed to the air, and be either run into pits or ladled out into moulds.

It may be interesting to know that the approximate yield of the several products per 1000 gallons of coal is as follows :

Crude and light oil, sp. gr.	940 to 970, from 24 to 40 gals.
Creosote oil, sp. gr.	1060 to 1070, from 120 to 180 gals.
Anthracene oil, sp. gr.	1080 to 1095, from 100 to 160 gals.
Pitch which melts at 175° F.	3·2 to 3·6 tons.

These products are again submitted to further operations for the purpose of getting benzole, toluole, light burning and solvent naphthas, carbolic and cre-

sylic acids, creosote for fuel and for timber, and anthracene: but the processes are not generally offensive, and, therefore, need not engage much of our attention, although a brief outline of them may be useful. The light oil is redistilled from stills with steam-jackets or with closed coils, or by blowing steam into it. That which flows up to a gravity of 940 is put aside for benzole and solvent naphtha, and the remainder is used for carbolic acid; it is then washed with lime water, and distilled for benzole and solvent naphtha. The heavier naphtha and the first runnings of creosote are washed with a solution of caustic soda for carbolic acid, which is subsequently separated from the alkali by neutralization with acid; and the green anthracene oil is allowed to stand until quite cold, when the crude anthracene separates from it in granular particles. These are strained off through canvas bags, and pressed in hydraulic or screw presses, whereby the crude anthracene of commerce is obtained. The approximative yield of each of these several products is:

From crude naphtha and light oil, from		6 to 10 p. c. tar acidt
" " " "		20 to 25 p. c. benzole.
" " " "		10 to 15 p. c. solven. naphtha.
Creosote oil	"	10 to 15 p. c. carbolic acid, etc.
Anthracene oil	"	10 to 12 p. c. crude pressed anthracene.

For the purpose of increasing the yield of anthracene, the distillation of the pitch is sometimes carried on until a spongy coke remains in the still, and under these circumstances the acridity of the evolved vapors is most offensive, and requires the utmost attention to prevent their becoming a nuisance to the neighborhood. The main points, therefore, to be observed in the conduct of works of this description are

1. The transport and storage of the coal tar in air-tight tanks or vessels guarded with boxes containing hydrated oxide of iron.

2. The proper construction of the primary receiver of the products of distillation, so that it may freely deliver them by special pipes to their respective receivers, and at the same time convey offensive non-condensable products to the scrubbers and purifiers.

3. The passage of the offensive non-condensable gases and vapors to a scrubber charged with a douche of cold water, from thence to an oxide of iron purifier, and thence to a tall chimney-shaft.

4. The proper cooling of the pitch in air-tight vessels before it is allowed to reach the external atmosphere, and the ventilation of these vessels through the scrubber and purifier before mentioned.

5. The use of a fan or other exhausting power, so as to draw all the noxious gases and vapors from the stills, the pipes, the receiver, and the pitch den, into and through the scrubber and purifier before mentioned.

The production of paraffine oil from cannel coal, and the distillation of the crude tar, as well as the distillation of petroleum and Rangoon oil, require like precautions, though not to the same extent; as the products are not nearly so offensive as in the case of coal tar products.

Gaiffe's Apparatus for Lighting Gas.

The lighting of the hall of the National Assembly at Versailles is effected by a number of chandeliers and sconces, carrying together 256 burners. Formerly the gas had to be kept lighted during the whole duration of the sittings, but since the painted ceiling was replaced by a glass roof, the gas was lighted only at the setting in of dusk. As it was found, however, that by the process of lighting up at that time the deliberations of the Assembly were much disturbed, the practice was adopted of lighting the gas before the commencement of the sitting, leaving little flames burning all the afternoon. The desire to save gas, as the disagreeable heat produced by so many burners, especially on hot summer days, led to the idea of lighting all the burners at one and the same time by electricity, a means which has proved effective.

The apparatus for lighting is by Gaiffe, and is described in the *Bulletin de la Societe d'Encouragement*, etc. It is located in a cupboard or closed recess near the door at the left-hand side of the president's tribune, where are also the cocks for the different gas-conduits. In this cupboard is likewise a Ruhmkorff electrical apparatus, of medium size, with self-acting mercurial interruption. This Ruhmkorff spindle is connected with an electric battery of four elements (after Leclanche), in which the zinc has a surface of 4 square decimetres (about 64 square inches). These elements, of considerable surface, are about equal to three Bunsen elements of medium size; but they act much longer than the latter. The Ruhmkorff apparatus produces sparks of 15 centimetres (5·9 in.) long, for transmitting electricity to the different chandeliers, etc. A separate conduit (wire) is provided for each chandelier and sconce; but the reconduction of the electricity is along a common wire. The conduits are formed of copper wire, covered by three coats of india-rubber, tarred thread, and linen cloth coated with caoutchouc. In places where this cable rests upon bearers or brackets, it is further enveloped in an india-rubber pipe of 2 millimetres thickness, and the bearers are formed of blocks of hard india-rubber, pierced with cylindrical holes, through which the wires pass. Isolation is consequently perfect.

Each conducting wire ends in an isolat d metallic knob, which is brought in connection with the induction wire of the Ruhmkorff spindle by means of a discharger ending in a ball, and connected with one end of the induction wire by means of a chain. The discharger has a handle of hard india-rubber; all the knobs are on an isolated iron plate, and are numbered. The other end of the induction cylinder is constantly in connection with the reconducting wire. Both wires, the c nducting and reconducting ones, are united in the chandelier which it is intended to light by a perfectly isolated metallic conductor, and have as many interruptions as there are burners. To this purpose a thick block of hard india rubber is inserted at the base of each burner, and between the metallic disc bearing the ball, through which pass two copper wires ending in platinum points. The different apparatus are united to each other by intermediate wires, and the ends of this interrupted chain are joined to the conducting and reconducting wires. In each lighting apparatus the distance intervening between the two platinum points is from one-third to half a millimetre; one of them dips into the escaping gas current, the other is somewhat above and outside it. Thus, combustible matter is always present at the point of passage of the spark. The spark passing over at the two ends of the conductor is much shorter than that produced in the apparatus; its length decreases from 15 centimetres to 25 millimeters; but, notwithstanding this difference, the discharge is sufficient to overcome with perfect safety the fifty-four interruptions of one-third of a millimeter which are in the conductors of the larger chandeliers.

When the gas is to be lighted, the spiral of induction is put in motion by closing the current of the galvanic battery by means of a lever provided with an india-rubber handle; the gas-cock is then opened, and sparks are produced by means of the discharger on the knobs corresponding with the different conducting wires. The process of lighting up lasts scarcely 15 seconds. The sconces of the tribune, which must be served by very extensive conductors, take one minute and a half to light; they must be lighted separately. At the moment of ignition, the apparatus is fully charged with electricity, accumulated while not in operation. The discharge is consequently more powerful than is absolutely necessary for obtaining the desired effect. This advantage secures the proper operation of the apparatus, even in very damp weather. If the apparatus were used a number of times in rapid succession, it would cease to have the desired effect. Tested to its utmost limit, it was found possible to ignite the gas twenty times in rapid succession without mishap. The efficiency of the apparatus is therefore established.

As the electric battery is in use for only two or three minutes daily; its wear and tear is inconsidera ble; it is, however, advisable to take care not to leave the current closed after its use. To prevent this happening, M. Gaiffe has so arranged the lever interrupting the current as to secure its being pressed down by the letting down of the sliding door closing the recess.

The conducting wires have a length of 1400 meters (1526 yards). The saving in gas effected by the use of the apparatus is said to be considerable.—*Builder.*

The Water Supply of Philadelphia.

The rapid growth of the city of Thiladelphia, and the necessity it has for an abundant and cheap water supply, makes the subject one of the greatest interest and importance. The *Ledger* has, in a recent issue, a very interesting editorial on this subject. It says: "It is not too much to say that no city in the world, of the rank and importance of Philadelphia, situated as Philadelphia is, on a broad and deep arm of the sea, is as well supplied by nature with the means for a copious supply of good, wholesome water. And yet, with such unrivalled facilities for such a situation, the city has been for years past more or less disturbed by agitations both as to the quantity and quality of the water supply. This has been the theme of councils and counsel committees, of "engineers" and contractors, and of discussions through the newspaper press. One might be led to think that it is beset by enormous difficulties, and yet no one who undertakes to examine it dispassionately, apart from "jobs" and what is supposed to be the interest of small sections and localities, can find any great difficulty about it, except that the subject is not capably managed, and that the city did not do in season what it ought to have done long ago.

The three points of importance are, an abundant supply, good quality in the water, and the most economical system of pumping machinery, and other appliances. For present purposes, and for the probable exigencies of the next thirty or forty years, the Schuylkill puts within the reach of Philadelphia the available means for all three of these important essentials. First, as to the quantity of the supply, it should hardly need argument to show that a stream that flows over the dam at Fairmount an average of more than 1,500 gallons every twenty-four hours, is quite certain to be able to furnish a copious supply of water to a city that needs an average of 40,000,000 of gallons a day now, and is not likely to need an average of more than 100,000,000 a day within the present century. Certainly there is enough here for the use of the inhabitants for generations to come for the ordinary household, manufacturing and other purposes for which our water supply is now used. So much for that branch of the question. But the overflow of the Schuylkill is valuable for other uses than a supply for the purposes named. It is the most economical power for driving the pumping machinery to lift the water into the high reservoirs from which it is distributed for use throughout the city. Is there a sufficient average flow of water down the Schuylkill abreast of the city to drive pumping machinery that will give us an average of 40, 50, 60, 80 or 100,000,000 of gallons a day for distribution daily throughout the city whenever so much shall be needed? This is of course a question for those acquainted with the rain fall over the area drained by the Schuylkill, the amount lost by evaporation and escape out of the area drained by the river, and for engineers capable of calculating the amount of pumping energy that remains in what reaches the several dams in the neighborhood of the city at Flat Rock and Fairmount. Engineers and other authorities differ somewhat in their answers to this question, so far as it relates to the wants of the city a generation or two in the future; but it may be said that the best authorities are of the

opinion that there is an abundance of water for all the purposes mentioned for the present and for the near future, provided the whole of the flow and power of the Schuylkill shall be utilized, and not allowed to run to waste as it does now, and provided the water wheels to do the pumping are properly placed. Thus we have reason to believe that we have in the Schuylkill the means of an abundant supply, and a cheaply furnished supply, for so long a time to come, that we need be in no trouble about the next third of a century at least.

Then as to the quality, Dr. Cresson's recent report of his examinations show that nearly all of the injurious pollution found in the Schuylkill water at some seasons of the year comes from sources quite close at home, all of which are under the control of the city, and every one of them preventible or avoidable There can be no reasonable doubt of this. Here the third of the three essentials is made quite available.

What, then, should be the policy of the city authorities? Clearly to seek for and adopt the best system for utilizing the whole flow and power of the Schuylkill, so as to secure an abundant supply for all seasons, both for consumption by the inhabitants of the city, and for the most economical power to drive the pumping machinery. Water-power is cheap, steam-power is costly; in the proportion of at least ten to one. The further policy is to adopt, without delay, the most effective means for preventing foul drainage from emptying into the Schuylkill above the dam, and within the city limits. The man who is put upon his proof to show that such is not the right policy—whether such man be "engineer" or layman—will have a rather difficult task.

What then shall be done now? Provide, as soon as it can be done, for what is indispensable next year, and do it in such a way as will make what is done now useful in any approved system that may be adopted hereafter, and in the meantime appoint a competent commission to ascertain whether the flow of the Schuylkill can be utilized to the extent required for the present and next coming generation.

Spontaneous Combustion in Coal.

By Prof. P. H. Van der Weyde.

We have drawn attention to the deterioration of coal in yards when not protected against rain by a shed or roof; but there is danegr of a much more serious nature to which well-protected coal is exposed, namely, spontaneous combustion. There is not much danger of this with our anthracite coal, but bituminous coal, especially that mined at present in England from great depths, is very subject to this action; and in fact so many coal ships have recently been destroyed by this cause, that it has been found necessary in London and Liverpool during the past year to raise the insurance premiums considerably. It has also occasioned the discussion of many theories as to the true cause of these casualities, among British underwriters and others. The most plausible of these theories that we have met with are: first, that the coal seams of the principal mines are getting so much deeper, that probably a more inflammable quality of coal is now being produced, or that it is shipped too quickly from the pit into the ship's hold; and second that ships are over ventilated. It has been suggested that a remedy would be found in the adoption of a system of thermometers, constantly examined, at various parts of the vessel on deck, and some contrivance when undue heat is observed, for the injection of water on the affected parts

This plan is impracticable, as the interior of a cargo of coal is not accessible for thermometers, while the water required to fill the spaces between the coal so as to shut off the air, would sink the ship; one might as well make a hole in the bottom of the vessel. A better plan would be to shut off the access of air by means of carbonic acid or sulphurous acid gas, or rather to use these gases to drive out the air, and with it the oxygen, the cause of all combustion.

To do this from above, and let the gas pour in through a hole in the hatches, as proposed by a contemporary, is a very imperfect method, as in this way the gas mingles too much with the air. The correct method is to have a few perpendicular tubes, open at both ends, made of boards, say 6 or 8 inches section, reaching from the hatch above to the bottom of the vessel, through the centre of the cargo; if through such a tube sulphurous or carbonic acid gases were caused to descend, they would spread horizontally over the bottom of the ship, under the air, and displace the latter by lifting it, causing it to overflow out of the hatches, until all the interstices were filled with a gas not only a non-supporter of combustion, but smothering any flame already commenced.

For the development of these gases all that is required is an apparatus in which carbonic gas is developed by bringing diluted sulphuric acid into contact with bicarbonate of soda, chalk, marble-dust, or any other cheap carbonate. The gas developed is by means of a hose conducted into the vertical tubes through which it will at once descend to the bottom. Ih order to develop sulphurous acid, it is only necessary to burn sulphur, and the vapors arising therefrom may be conducted first upward, and then by a suitable arrangement downward into the tube. If the sulphur were burned in or over the tubes, the heat would cause an ascending draft, and the gas produced would not descend in them; therefore it should be burned in an apparatus the shape of an inverted U, thus ∩; the gas ascending in one arm and cooling in the other, would then descend, and so reach the top of the long vertical tube, into which it would flow by its own gravity, as it is heavier than air.

Almost every one knows that the gas of burning sulphur will arrest fire in a chimney when the soot ignites, as is sometimes the case where bituminous coal is used, whence sulphur thrown on the fire will extinguish any flame in a chimney, and is often used for this purpose.

Vessels could be so built as to admit of the introduction of such gases at a few places in the sides between the beams; the channels for this purpose opening in the floor of the hold, by a number of small holes, would make the introduction of flame-suffocating gases by displacement of the air very easy, while the partitions of the hold could be made air-tight fore and aft, so as not to admit the gases into the forecastle or cabin.

Something of the kind ought to be done, as recently about a dozen large coal ships were burned, and the insurance premiums on ships and cargoes of coal have been raised in England to 20s. per ton register, making the cost of transportation about equal to the value of the coal.—*Manf. and Builder.*

Purification of Metals by Filtration.—If the substance of which a filter is composed has no attraction for the particles of the liquid to be filtered—that is, is not wetted by it, the interstices of the filter do not act like capillary tubes, and the liquid will not pass through. Mercury will not run through a very fine sieve of iron or copper wire unless the wire be amalgamated, although the meshes be very fine, the mercury will pass through easily, while any pieces of iron, copper or amalgam will be retained on the filter. Lampadius, formerly Professor of Metallurgy in Freiberg, has attempted to make use of this principle in purifying the easily fusible metals, and with what success the following will show: Tinned sheet iron, as thin as paper, was cut into strips six inches long and four inches wide. Five hundred of these were placed face to face and fastened in an iron frame, with wedges driven in to bring them closely together. This frame was luted into the bottom of a graphite crucible. Some impure Bohemian tin was melted in another crucible, and allowed to cool until crystals began to form on the surface, when it was dipped into the filtering crucible. The tin, which was still fluid, ran through almost chemically pure, while a pasty magina remained on the filter, which contained iron, arsenic and copper chemically combined with iron.

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

Prof. Wurtz's Harlem Report.

San Francisco, April 15, 1875.

Mr. Editor: In my last note upon this subject, I mentioned that Mr. W. H. St. John was in error in stating that no apparatus except his own would remove coal tar; and this mistaken notion of his also induced one or two questions about points upon which he was not very clear.

At the date of that note, Prof. Wurtz's pregnant analyses of the Harlem gas had not reached me. The paper containing them had been lost in the mail, and it occupied some time to write to the business office of your Journal, and obtain a new copy.

Prof. Wurtz states that the Harlem gas contains, practically, little naphthaline and no coal tar at the inlet of the purifiers.

He also tells us that the apparatus separates about 11 per cent. each of the sulphuretted hydrogen and carbonic acid, and about 30 per cent. of the ammonia, carried at the outlet of the hydraulic main. The temperature of the gas at the outlet of the apparatus was from 95° to 100°, and the gas at the inlet to purifiers carried 4½ gallons of water per ton worked; 237 grains of ammonia per 100 cubic feet, and between 80 and 90 per cent. of the original carbonic acid and sulphuretted hydrogen.

This quantity of ammonia is equal to 23,700 grains of ammonia, or 13 lbs. of sulphate, per ton. In the face of this, I notice in a recent number of your Journal this extraordi nary statement, viz.:

"The reason why a series of boxes is constructed, is not for the purpose of extracting tar or naphthaline, but to apply the solvent properties of the water in combination that is not exhausted in the fir-t box, in order to arrest the last vestige of the *ammonia*."

I quote verbatim, even the italics being the author's own. It is generally held difficult to separate carbonic acid—still more, ammonia—at any such high temperature as 100° Fah. The Beckton Works proved this on an immense scale, and Prof. Wurtz's elaborate tables reiterate the proof, from the stand-points of a cultivated chemist.

The tar washers of the Harlem apparatus would probably be obstructed by a viscous deposit of naphthaline if any lower temperature than 90° to 100° were permitted; but why the gas, still terribly foul with the three other impurities, is not partially stripped of them by further cooling before entering the purifiers, is inexplicable by any statement yet presented.

We may however wonder how the iron-mixture and lime used in the purifiers manage to handle a gas of such unequalled foulness, and yet deliver such gas as was analysed by Prof. Chandler.

I have had a good many inquiries regarding the Pelouze & Audouin condenser, which will probably be noticed in your next. Very truly,

James R. Smedberg.

Cost of Water in Brooklyn.

During the past winter Brooklyn has been drawing so heavily upon her reservoirs that the water commissioners were seriously alarmed for the supply. So rapidly did the consumption increase during the extreme cold weather that the water level of the reservoirs was lowered much below the proper limit. And it is probably owing to this fact, and the velocity of flow through the pipes, that the water has been so turbid for a considerable portion of the time during the winter. During the few days in which the consumption reached its maximum, the pumps were unable to supply the water as fast as it was used, hence the lowering of the water in the reservoirs. Had it not been for the appeal of the commissioners to the people, through the columns of the daily papers, it is

probable that the city would in a few days have experienced a water famine of the severest character. The consumption at this time was not a legitimate one, people fearing frost left valves, faucets, cocks, in fact, every opening in connection with the mains, wide open. The result was a waste that was really alarming. A circulation is all that is needed, and a small stream constantly running will keep this up, and as effectually prevent freezing as a faucet left wide open. The following figures will give our readers some idea of the cost of the water, and how important it is that all unnecessary waste be prevented.

The cost of the works, under the original contract, was $4,625,000, and the expense of extending and perfecting them during the subsequent years has more than equalled this amount. The total cost at present is $9,500,000, and their value, or the cost of constructing them, at the existing rates for land, labor and material, has been estimated at $15,000,000. The rates have been so adjusted as to cover, as nearly as possible, the necessary expenses of interest, deposit and maintenance, and the surplus, if any, is, by recent legislation, made a part of a special sinking fund. The water revenue is collected in two forms—as regular and as extra rates. The regular rates are calculated upon the front dimensions of the building before which the distributing pipe passes; or, in the case of vacant property, upon the frontage and assessed valuation. Each building is entitled to the use of one bath, one water closet, and the necessary sinks and basins for the domestic uses of twelve occupants, without charge further than the payment of the regular rates: all water fixtures and occupants in excess of these are subject to additional charge. The regular rates accrue whether the water is introduced into the premises or not, and become a lien upon the property in the same manner as the city taxes. The extra rates are collected for the use of water for other than domestic purposes, and their payment is enforced by the cutting off of the supply. The rates are established upon the basis of a charge of 3 cents per 100 gallons of water used for domestic purposes, 2½ cents for a like amount of building, stabling, fountain and tavern uses, and 2 cents per 100 gallons for business and manufacturing purposes, steam engines, etc. For the latter uses, the quantity taken is accurately determined by meters; but in the other cases, as there are no means of limiting the quantity consumed by each, the rate as far from uniform or equitable.

During the year 1872 the cost of pumping alone was one-eighth of one cent per 100 gallons. Not far from 35,000,000 gallons were used for fire and sewer purposes, and about 3,000,000,000 gallons were paid for at the rates above, leaving over 5,000,000 gallons furnished gratuitously. It is evident that an enormous waste of water is allowed by many negligent members of the community; in fact, the average consumer, who pays but $10 a year for the use or water, may, by leaving his faucet open, waste in one year $300 worth of water, at the established rates, or water that it has cost over $20 to pump into the reservoir. A general system of supply by measurement through meters would, no doubt, curb the extravagant waste, but might, on the other hand, induce an economy of water that would be prejudicial to the public health and cleanliness, and interfere with the proper discharge of the more solid portions of the sewage. A reduction in the size of the taps, or the use of meters designed to discontinue the flow when the amount of water paid for by the rate fixed upon the premises shall have been drawn, would seem a medium course, and one promising favorable results. —*Iron Age.*

Science at the New Paris Opera.

Under this heading *Nature* condenses from its French namesake an interesting description of some of the scientific appliances incorporated in the construction of the great theatre recently completed. The first difficulties to be encountered related to the warming and ventilation of so vast a space, complicated by the changing conditions of emptiness and repletion with spectators, alternate union and separation of the atmosphere of the stage and auditorium as the curtain is raised or lowered, etc. To raise the temperature with sufficient rapidity before the commencement of a performance, and to provide for a renewal of air at the rate of nearly 3,000,000 cub. feet an hour, hot water and hot air furnaces are employed, fourteen in number, and consuming daily about ten tons of coal.

To carry off the vitiated air, the upward draught created by the central lustre is utilized through several large conduits communicating with different parts of the house, while fresh air is admitted through openings measuring from twenty-four to thirty square meters. To avert a far too common source of danger to the performers, the foot lights are ingeniously arranged to burn upside down, their reversed glass chimneys being connected with a transverse pipe through which a current of air circulates strong enough to draw the flame downward and keep the metallic burner from becoming heated. These and all the other gas-lights in the building are so contrived that they can be suddenly lowered for a night effect, without the risk of extinguishing a single one. In lower room are contained gasometers of hydrogen and oxygen for the oxy-hydric light, and a gigantic galvanic battery of 360 Bunsen cells, the nitrous vapors from which are neutralized by ammonia. From this battery wires aggregating nearly a mile in length are led to the stage, where the intensity of the current may be varied to produce different optical effects with the electric light. In the opera of "Moses," by throwing this light into watery vapor, a genuine rainbow is projected on the scene, and numerous other brilliant phenomena are displayed. Throughout every department of this magnificent building science seems to have been brought to the aid of art; and the government expenditure of 40,000,000 francs, which has aroused the jealousy of the purely scientific societies, has at all events resulted in showing how advanced civilization may be concentrated in "a mere place of amusement."

Determination of Sulphur in Coal, Coke, Pyrites, Gunpowder, Etc.

By S. Dana Hayes, State Assayer for Massachusetts.

In a recent number of the London *Chemical News*, W. F. K. Stock, F.C.S., gives the following method: "One grm. of coal or coke, in fine powder, and 1 grm. of pure lime are mixed in a platinum capsule 9 c. m. in diameter, having perpendicular sides 1·3 c. m. in depth, and weighing about 30 grms.; distilled water is then added in sufficient quantity to form a thin paste of the consistency of cream, and the whole stirred with a short glass rod until the operator is sure that every particle of the fuel under examination is in perfect contact with the solution of calcium hydrate. The capsule is now heated upon a thick cast-iron plate by means of a Bunsen's burner, and as soon as the mass becomes dry, which is easily accomplished, it is stirred to a coarse powder, and heated to bright redness in a muffle for about twenty minutes, at the end of which time the whole of the carbon will have undergone combustion. The capsule is allowed to cool, and 3 c. c. of a concentrated solution of ammonium nitrate are added. In making this addition, care must be taken not to allow the solution to mix too freely with the assay, otherwise loss of substance is sure to result from the energetic action of the calcium oxide upon the ammonium salt. It is best to scrape a portion of the lime from the bottom of the platinum vessel, and to drop the solution gradually upon the bare spot by a pipette. The mass is again brought to dryness and heated to redness for five minutes, then cooled, dissolved in dilute HCl, and the sulphur determined as $BaSO_4$, in the usual manner."

A simple modification of the process just quoted has been in use here for a long time for determining sulphur with accuracy, in coal, coke, pyrites, gunpowder, etc. About a gramme of the substance to be analyzed, in fine powder, is soaked in four or five times its measure of a strong solution of pure sodium hydrate in alcohol for a few minutes in a platinum capsule; then four or five grammes of pure hydrated lime are gradually added, and the whole mass, which has about the consistency of thick cream, is again thoroughly stirred with a strong platinum wire and without the addition of water. The other parts of the process are like those given by Mr. Stock; although in many cases sodium nitrate in fine powder may be stirred in directly with, and in place of, one-third or one-half of the lime, and thus the necessity for a subsequent ignition with ammonium nitrate is obviated.

The advantages gained by the use of the alcoholic solution of sodium hydrate in this method of analysis are important. It insures coating and permeation of each particle of the pulverized substances operated upon with pure soda; it facilitates the thorough mixing of the materials by stirring; and it enables the operator to heat the capsule immediately, without preliminary drying, as the alcohol burns off without any spirting or danger of loss of material.

The solutions of sodium hydrate in alcohol, and pure calcium hydrate in powder, are easily prepared, and are most useful reagents in the analytical laboratory for many purposes.—*American Chemist.*

German Kitchens.

The German kitchen, with its furniture or lack of furniture, and the operations conducted in it, are thus described in *Fraser's Magazine*:

The kitchen is a small bare room, with a brick or concrete floor; no oil cloth, no cocoanut matting, no pretense to comfort. You wonder how all the routine of cookery and scullery can be carried on in it. The copper pans on shelf and peg shine warm and bright from the walls, the window is clean, and buckets full of water, with a large brass water-scoop, show that all is ready for the day's operations. The mere cooking is far more easily accomplished in a German than in an English household. The hot metal plates, provided with numerous circular holes into which rings can be fitted or from which they can be hooked out, to suit the exigencies of the various pots and pans, according to their position, and are plunged into the circular holes by which they come nearer to the fire when accelerated speed is desirable. The servant has here again a vast amount of labor saved her; not only that she has no hearth-stoning, fender-polishing, or black leading to accomplish, but that she can get at all her *plats* readily without burning her face and hands or straining her muscles as with us, by stretching over a wide hearth in front of a scorching fire, to the detriment alike of her clothes, health and temper. I may mention that drunkenness is quite unknown among female servants in Germany, and one cannot help feeling that a great deal has been done for them by this contrivance of the hot metal plates.

Knowing the value of fuel, and the extreme frugality which is observed in all households as to this most expensive item of domestic economy, a German servant will give you no trouble in the matter. Having heated water for your early coffee (a mere handful of firing has been necessary for this), she allows the flame to die out. She will draw the few living embers to the mouth of the grating in the hot-plate, and lay a piece of peat upon them before she goes to market. When she returns, a few puffs of breath blow the smoldering heap into life, and her saucepans will soon be boiling in merry concert. The moment dinner is over she will fill every available vessel with water, so that she has a supply sufficiently warm to wash up with, and the fire again dies down. It has to be lighted for supper, but the same frugal rule is observed, and as the hot plate affords no warmth beyond that immediately beneath the saucepans, there is no temptation to make a larger fire; nor do I remember, in a single instance, having had to remonstrate as to waste of fuel.

Peat-Fuel.

Dr. Van der Weyde made a communication last summer to the American Association for the Advancement of Science at Hartford; on a new improvement in peat manipulation, which we presume must have referred to the same thing as the following, from the New York *World:*

The Walker Peat Machine has recently been tested on a large scale and proved completely successful, peat of the best quality having been produced by it. The patent in question is now owned by Mrs. R. E. White, of this city, the widow of the late Judge White, and was purchased by her from the inventor, Thomas George Walker, after $30,000 had been spent by him in perfecting the invention. Works have been erected near this city, and two machines erected, which have demonstrated by their success the accuracy of the statements then made regarding the new process, which promises to work as complete a revolution in the manufacture of peat as the introduction of vacuum pans in sugar-refining or the hot blast in the manufacture of iron. By this invention the crude peat is turned by a single process from a brown fibrous and crumbling mass into a hard and solid cylinder, of a jet black color, taking a high polish, and having a defined fracture and cleavage, the latter perpendicular to the line of the pressure by which the cylinder is formed. Previous to the construction of the works which have just been completed the principle of the machine has been tested, but only on a small scale. The last experiment was held by the engineers, who were present and inspected the process, to dissipate any doubts which might have been felt as to the practicability of manufacturing the peat by this process in large quantities. The principle of this machine is comparatively simple, and consists principally in the direct use of steam in forcing the peat by repeated impacts through a tube curving through a furnace fire, the tarry properties keeping it in a yielding, plastic state.

Gas Items.

ALBANY LEGISLATION.—Since our last we find little of interest in this line.

May 4. The Assembly Committee on Cities will tomorrow report adversely the bill providing for sinking telegraph wires underground in New York and other large cities. The friends of the bill agree to this report to get it before the Assembly at all.

May 5, the Senate authorized the village of Athens, Greene County, to lay gas pipes.

May 12, the Assembly bill introduced by Mr. Daly, providing that all concrete and wood pavements shall be from time to time replaced by stone block pavements was favorably reported in the Senate.

JERSEY CITY.—From the *Journal* of this place, we learn that in the Board of Police Commissioners, May 4, President Marinus took the floor and made a speech of half an hour's duration, in which he said that the people are groaning under a tremendous gas pressure. The tax levies are rolled up to an enormous figure, because of the heavy tax for lighting the streets. There is a new lamp, just patented by Babcock & Co., of New York, which gives a light equal to gas, is as cleanly and handsome in appearance, and only costs two-thirds the cost of gas. He offered a resolution that the Committee on Lamps and Lights be instructed to contract with Babcock & Co. for 1,000 of their lamps, at $40 per annum or less, to take the place of the same number of gas lamps taken off. Mr. Marinus showed that by passing this resolution, the Board could save $22,650, and still have the streets as well lighted as now. Again, the taxpayers in Greenville demand light, and the Babcock lamps can be placed in the streets in that place. Mr. Brigham said that he thinks a compromise in price of gas can be made with the Peoples Gas Light Company, by which a great saving can be secured. Mr. Marinus' resolution was laid over until next meeting, but the Committee on Lamps and Lights was directed to confer with Babcock & Co., to see what are best terms they will offer.

PORT JERVIS.—We referred to the injury to the gas works by the freshet at this place in March. We learn that on May 4 the taxpayers voted down all but a few of the tax appropriations, including those for salaries of different officers, policemen, lighting of street lamps and gas, printing and everything necessary to run a village. The town was in complete darkness, and we have not heard of any "let-up," in this state of things up to present writing.

BUFFALO, N. Y.—From this city we have May 5, the following curious bit of news: "The coroner's verdict in the late gas suffocating case declares that Edward Connolly and his son came to their death through the negligence of the Buffalo Mutual Gas-Light Company in not keeping their surface pipe in good order."

On April 23, the Assembly authorized the trustees of the town of Athens to lay gas pipes.

The matter of street pavements is one which indirectly interest gas comprnies; so we note that this Legislature has manifested a great opposition to all the modern innovations in this line, and has, we believe, directed that all the wood and concrete pavements in New York city be replaced by stone or macadem.

MORE GUANO.—On the 1st of April the news came of "*another* great discovery of guano in Peru." Doubtless, however, those who may expect it to be any *cheaper* in consequence, may find themselves under the 1st of April glamour. These reiterated reports, however, are naturally somewhat discouraging to the idea of substitution of ammoniacal fertilizers prepared from gas-house products.

Protection of Buildings and Ships from Fire.

At the Society of Arts, Mr. J. A Coleman, C. E. (U.S.A.), read a paper on this subject. He began by stating that in Great Britain and America alone the annual loss of property by fire is represented to be over 50 million pounds sterling, or something like 10s. for every man, woman and child in both countries.

He passed on to inquire why we were so powerless against fire. Engineering ability had been successfully brought to bear upon almost every other great problem, but it was evident that far less thought had been devoted to this important subject. Of late years some important improvements had been made in the substitution of steam for manual power to work our fire-engines, and in some minor details; but whilst the engines have received the assistance of a motor whose power is almost without limit, the means of conducting water to a fire remain unchanged. The effect of the engine was crippled by the hose, which, from its nature, could bear but a limited pressure. The improved engine of the present day could not throw an effective stream of water to double the height attained by the first fire-engine, constructed over 300 years ago.

All that had been gained over the old engine was the ability to throw a larger volume of water continuously to only a moderately increased height. To this extent only had the situation been improved. The theory for putting out fires, in all essential features remained unchanged, while the difficulties of the old system had increased. What, then, was the underlying trouble with all our fires in buildings or in ships? Simply a fault of engineering. It was the failure to put a little water in the right place at the right time. It was the failure to strike a fire dead in its incipient stage. Any system, to be successful in extinguishing fire, must be capable of prompt application. It must also be able to do the least possible damage, by using the smallest quantity of water necessary to accomplish its purpose. A bucket full of water in the right place at the right time was worth more than 20 tons of water 20 minutes later. The plan he proposed was to put iron stand-pipes upon buildings, one going to the roof, and others to the separate stories. Then perforated branch-pipes were to be laid at suitable distances apart, over the roof and under the eaves, to distribute water like a rain-storm over the entire top and sides of the building, in case heat and flames were attacking it from another edifice on fire. Perforated branch pipes were also to be fixed upon the ceiling of each story, in order to strike the top, sides, and floor with small jets of water. Each story has its own stand-pipe and valve, or cock, the latter being operated from the sidewalk. All the cocks were intended to be placed in an iron box let into the wall of the building, always locked to prevent tampering with by improper persons. By this apparatus it would be seen every square foot of the exterior and interior of a building could be commanded under all circumstances by a man quietly manipulating the proper valves from the sidewalk, without the necessity for going near the danger.

If there should be a sufficient head of water, the distributing apparatus described would be connected directly with the mains in the street, and its control placed in the hands of the city authorities. Should there not be a sufficient head of water, there must be steam-boilers and pumps.

For ships he would have a somewhat similar apparatus. A ship of 1200 tons could be fitted with his apparatus for £300, and by it all danger of fire at sea would be avoided. The vent lation of ships he would effect by the use of compressed air nnd perforated pipes, which would diffuse the introduced air all over the interior space to be ventilated. The principle had already been carried out successfully in the Mont Cenis Tunnel. The use of steam as a means of extinguishing fires he had ascertained, by experiment, to be of doubtful efficacy.

In the brief discussion that followed, the lecturer was complimented on the ingenuity of his plans, but some doubts were expressed as to their being applicable to European as they were to American buildings, also as to whether their expense would not be an obstacle to their introduction.

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MONDAY, MAY 17, 1875.

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THE GAS-LIGHT ASSOCIATION.

We are fortunate enough before going to press this time, to be able—by sending a special messenger to Washington—to present a first instalment of the proceedings of the Association.

The address of Mr. Price—though made on the spur of the moment, as he says, and evidently without any forethought—could not have been more to the point than it was, or more precisely appropriate to the occasion and to the peculiar crisis of affairs now pending, in the advice it conveys to the gas-profession. We do not yet know, at this writing, how this intelligent and practical advice, from a man whose words should not fall to the ground, was received and followed up by the assemblage, or whether any practical measures were adopted looking to scientific and reliable investigation, which, and which only, can put the profession in a position to meet the cry which, as Mr. Price says, we hear in every direction—"Give us cheaper gas."

We hope, however, for the best, and trust that when the complete proceedings of this important meeting are before us, we shall find that they went further than the mere appointment of committees of consultation, and that steps were taken to place at once in competent hands the chemical investigation of the various new schemes which are urged upon the gas-producing public at the present day; to ascertain which of them will conduce most to the mutual benefit of producers and consumers, that is, of the whole public.

One point which seems inferable from Mr. Price's remarks—but which he may not have intended to be inferred—we would, however, exclaim against. It would seem to follow, from the view he takes of the causes of the "cry" above alluded to, that this cry may turn out to be a merely ephemeral thing, and that, on the return of more prosperous times, which, as every body knows, are as sure to come in the course of time, as the sunshine follows the shower, this cry may no more be heard in the land.

This we do not believe; and our reasons could we command space for them now, would we think be convincing to most readers. The public feeling, which has given birth to this cry, has a far deeper and more solid foundation; and if this public feeling is not speedily met, in the way in which we have above indicated, the results will be largely detrimental to the interests of many who deem themselves possibly above all consideration of public opinion; and, what is of more importance to the public of this country, will so retard the progress of our civilization, as to cause us to be left perceptibly in the rear of other nations.

NATURE OF GAS-RETORT CARBON.

The "Manchester Literary and Philosophical Society," is a scientific body of considerable distinction, many important contributions to science having been made under its auspices. We could not, therefore, but indulge in a little surprise when the following, from its proceedings of March 9, 1875, met our eye:

"Mr. Arthur McDougall, B.Sc., invited attention to a specimen of carbon formed upon the roof of a gas retort by the decomposition of the hydrocarbon gas by heat. The carbon thus formed resembles graphite in its almost metallic lustre, and it was suggested that its mode of formation might throw some light upon that of graphite. Graphite always occurs in association with rocks which have been subjected to igneous action, and may have been formed by hydrocarbon gases traversing fissures or dykes whilst the sides were in a highly heated state, thus causing a deposit similar to that formed in gas retorts. The fact that in the latter case an increase of pressure causes a greatly increased amount of deposit favors this view, as it is extremely probable that any gases existing in the earth's crust would be in a state of great tension."

We are almost led to believe that Mr. McDougall, Bachelor of Science, assumed he was inviting attention to a material possessing novelty *per se* for his distinguished hearers; but such an assumption could not have passed without rebuke upon the occasion. But it was certainly singular that there should have been apparently no one present able to refute his inaccurate assertions and absurd speculations about graphite, by citing Berthelot's experiments proving that retort-carbon contains no trace of graphite. Many years since, the English chemist Brodie discovered that when graphite is acted upon by a heated mixture of chlorate of potash and nitric acid, it is converted into a peculiar substance called *graphitic acid*. This furnished Berthelot the method for the analysis and particularly for the search for the existence of graphite in a great number of carbonaceous materials, both natural and artificial. He found, when operating upon all forms of carbon produced by the decomposition of hydrocarbon gases by contact with incandescent surfaces, including gas-carbon, that they all dissolved in Brodie's reagent with more or less facility completely without forming a trace of graphitic acid. Even samples that had passed through the hands of other eminent chemists, such as Regnault and Gaudin, and which simulated graphite itself so remarkably as to have passed under the name of "artificial graphite" from gas-retorts, he found to contain none whatever.

Berthelot went even further and proved that gas-carbon contains hydrogen in its constitution; being, in point of fact nothing more than a hydrocarbon, or a mixture of hydrocarbons, of very highly carbonaceous and greatly condensed molecule.

As even distinguished English chemists would seem to be unfamiliar with these interesting investigations of Berthelot, we need no apology for referring to them briefly in these columns. We look to see, as usual, the paragraph we have quoted, copied and circulated far and wide, through the technical journals, and kept going, for several years. Our readers, at least, will be prepared to receive it at its true value.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

We discharge a duty that we feel incumbent on us, in calling our readers attention, at least, to the following:

Last summer at the Annual Meeting of the American Association for the Advancement of Science, at Hartford, Ct., a new Constitution was adopted, and by its provisions a permanent subsection of Chemistry, Chemical Physics, Chemical Technology, Mineralogy and Metallurgy was organized. Professor S. W. Johnson, of Yale College, was elected Chairman of the new subsection for the ensuing year, and Professor F. W. Clarke, of the University of Cincinnati, was deputed to make the necessary efforts to ensure a full attendance of chemists and others interested in the applications of chemistry.

The meeting for this summer will be held at Detroit, Michigan, commencing the 11th of August, and continuing about a week.

Professor Clarke has requested attention to the subject; and we would certainly urge that

such of our readers as take interest in chemical science and in its applications to the theory and practice of gas-making or any of the skilled arts, should endeavor to be present on this occasion, and even contribute something that may tend to draw the attention of the assembled chemists of America to these arts. We have before referred to the absence of any good understanding or affiliation between the gas engineers and the scientific chemists of this country, classes which could work in harness with such mutual advantage; but which really seem almost entire strangers to each other.

There seems here an opening, which, in fact, amounts to an invitation, from the chemists of the country, to the gas-profession among others, to meet them publicly and fraternize, for their own and the public good.

EXTRAORDINARY PHENOMENON.

We have done something in previous articles, to convey and impress our conviction, long held, which has been quite at variance with the general impression of the gas-profession, that the petroleum-product of Pennsylvania could be depended on to our last day and generation, and that the numerous reports, originating with those who want to "bull the market," of a decadence and an approaching exhaustion, and so forth, would be most mischievous things to believe.

Our readers are aware that last year a geological survey was instituted in Pennsylvania; one of the strongest arguments used in inducing the people, through their legislators, being that the capabilities of production of this new and wonderful product would be made manifest and defined. It seems that this reasonable public expectation is to be wholly disoppointed. Prof. Lesley, the Chief of the Survey, announced to a recent meeting of the National Academy of Science, as follows:

"One section of the State could not possibly be surveyed, and that was the oil region. The moment an assistant was put into the oil region the oil men objected, more petroleum being now produced than the market would bear, and the party did not dare go there in order to make measurements on account of the fear of further discoveries of oil-producing strata. Among coal men also a like opposition to the operations of surveying parties was found, so that in those sections of the State nothing of importance could be done."

After this amazing statement we must rest satisfied. We do not suppose any one will ever have the "cheek" again to claim that the petroleum is in danger of drying up.

In reference to the coal region also, the statement is worthy to be pondered. What in the name of Common Sense and Humbug, are we to expect from this Survey, if it is to teach us nothing more than we already know, about either the petroleum or the coal, of Pennsylvania?

GAS-HOUSE AMMONIA.

Speaking of gas-house ammonia, the chemist Wittstein calls attention to the fact, that nearly all the commercial ammonia is made from gas liquor, which contains small quantities of aniline, toluidine, etc. In the purification of gas-liquor these compounds enter with the ammonia into all other combinations, and remain finally in ammonia-liquor in such decided traces that they may be recognized by the color of their oxidation products. If nitric acid is partially neutralized by such ammonia, a rose or deeper red color is produced, which disappears again on the further addition of ammonia to supersaturation. If the ammonia is at once added in excess, this coloration is not observed. On testing two samples of "chemically pure" ammonia in our own laboratory, we found one to answer very strongly to this important new impurity test discovered by Wittstein, and now recall cases in analytical work in which we have been greatly puzzled in consequence, and in which, if rash, we should have concluded that *cobalt* was present in the substances under analysis, but luckily did not do so.

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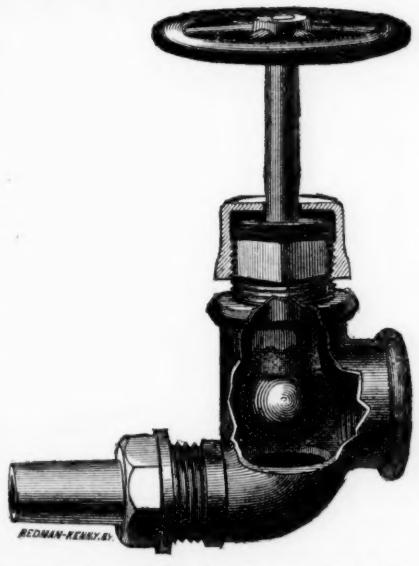

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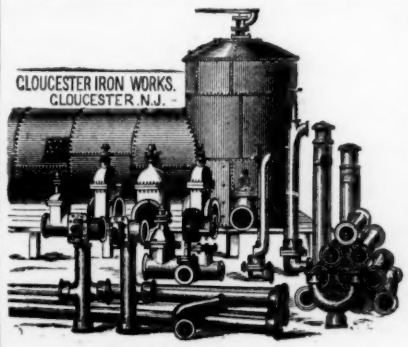

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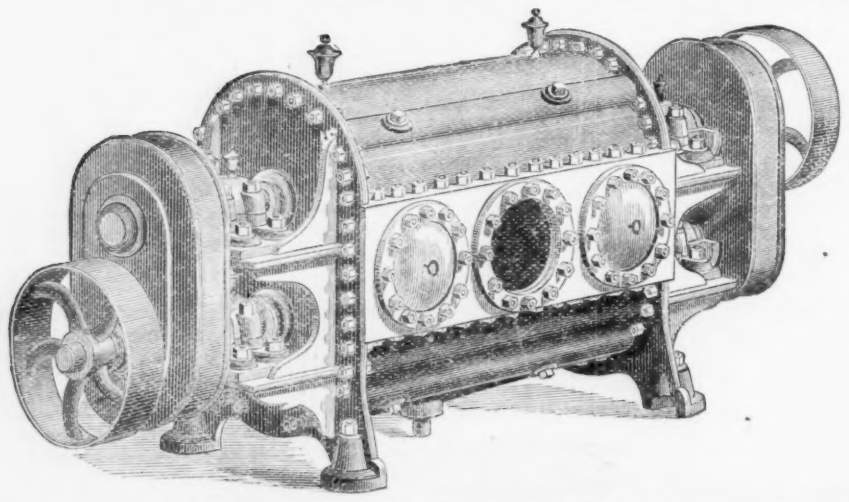

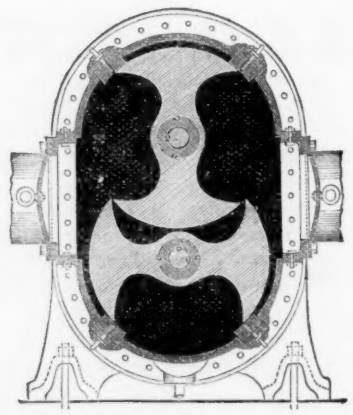

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New York and Cleveland Gas Coal Company—384 Penn Avenue, Pittsburgh. Pa..... 6
Ohio Gas Cannel—G. Merryweather, Pine cor. Wm. sts.
Peytona Cannel Coal—S. E. Low, 58 Broadway, N. Y..... 5
New York..... 3
Red Bank Mining Company—Bird, Perkins & Job, 27 South st., N Y..... 7
Sterling Coal—Freeman Butts, Cleveland, Ohio..... 6
The Newburg Orrel Coal Co.—Chas. W. Hays, Agent in New York, Trinity Building, 111 B'way, Room 7. 6
Tyrconnell Gas Coal—52 S. Gay Street, Baltimore, Md..... 6

FOUNDRIES.

Atlantic Dock Iron Works—John P. Kennedy, Office 98 Liberty street, N. Y., P. O. Box 2348.....
Cast-Iron Pipes and Fittings—B. S. Benson, 52 East Monument street, Baltimore, Md.....
Continental Works—T. F. Rowland, Greenpoint..... 6
Camden Iron Works, Camden, N. J.—Jesse W. Starr & Sons 5
Gloucester Iron Works—J. P. Michellon, Sec., 6 North 7th street, Phila., Pa..... 4
Mill Street Foundry.—Geo. Stacey & Co., Cincinnati O.... 5
National Foundry and Pipe Works—Wm. Smith, Carroll, Pike, Smallman & Wilkins streets, Pittsburg, Pa..... 6
Pascal Iron Works—Morris, Taskar & Co., Philaelphia....12
Providence Steam and Gas Pipe Co., Providence, R. I.—H. A. Branch, Agent..... 3

WATER METERS, PUMPS, ETC.

Cast Iron Pipes for Water and Gas—Riley A. Brick, 112 Leonard street, N. Y..... 10
Valves for Water, Steam and Gas—Ludlow Valve Man'g Co., 940River street, Troy, N. Y..... 6
Water Pipes, etc.—S. Fulton & Co., 412 Walnut st., Phila... 7

CLAY RETORT WORKS.

B. Kreisher, Clay Retorts, etc., 58 Goerck st., New York.... 8
Cheltenham Fire Brick and Clay Retort Works—Evens & Howard, 916 Market street, St. Louis, Mo.... .....
Jersey City Fire Brick Works—J. H. Gautier & Co., Greene, Essex and Bergen sts., Morris Canal Basin, N. J..... 8
Manhattan Clay Retort Works, 15th st., near Av. C, N. Y.. 8
Philadelphia Fire Brick Works, Vine and 23d sts., Phila.... 8
Retorts, Etc.—Geo. C. Hicks & Co., Baltimore Md 4

LAMPS, STOVES, PETROLEUM, ETC.

Patent Lamp Post—J. W. Graham, Chillicothe, Ohio, or A. M. Callender, office of this Journal..... 9

MISCELLANEOUS.

Analysis and Testing of Gas Coals—Prof. Henry Wurtz, 12 Hudson Torrace, Hoboken, N. J. 10
Architect and General Gas Engineer—William Farmer, 111 Broadway Room 95..... 5
American Gas Works Construction and Supply Company—61 Broadway, N. Y..... 3
Cements—S. L. Merchant & Company, 76 South st., N. Y...
Contractors for Gas Works, Etc.—Murray & Baker, Fort Wayne, Ind..... 2
Fodell's System of Bookeeping—A. M. Callender & Co., 42 Pine st., New York.....1
Gas Engineer—B. E. Chollar, 914 Olive St., St. Louis, Mo... 5
Gear Wheels—Scott, 98 Chambers St., N. Y..... 5
Gas-Light Company of America, 63 and 64 Drexel Building, New York..... 2
Kidd's Gas Consumers Guide—A. M. Callender & Co., 42 Pine Street, N. Y.....
Massachusetts Institute of Technology—Samuel Kneeland Boston, Mass.....
National Coal Gas Company—H. P. Allen, 4 Warren street New York..... 6
Retort Setting and Working—E. S. Cathels, Montreal, Can. 8
School of Mines, Columbia College, East 49th st..... 9
Screening Shovels—O. R. Butler, 126 Maiden Lane, N. J.... 7
Scientific and Practical Chemist and Geologist—Profetsor Henry Wurtz, 12 Hudson Terrace, N. J.....
Screening Shovels—G. W. Dean, 1358 Broadway, N. Y.....
Springfield Gas Machine—Corner Canal and Centre St.....
Slade's Automatic Fire Governor—Jas. Slade, Gas Works, Yonkers, N. Y.....
Scotch Fire Brick—S. L. Merchant & Co., 76 South Street, corner Maiden Lane, N. Y.....
Works upon Gas—D. Van Nostrand, 23 Murray street and 27 Warren street, N. Y..... 9

THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies throughout the country.

Agents, PARMELEE BROTHERS, No. 32 Pine street, N. Y.

BANGS & HORTON, No. 31 Duane street, Boston.
Mines in Harrison County, West Virginia.
Wharves Locust Point, } Baltimore.
Company's Office, 29 South street, }

Among the consumers of Despard Coal, we name : Manhattan Gas Light Company, New York ; Metropolitan Gas Light Company, New York ; Jersey City Gas Light Company, N. J. ; Washington Gas Light Company ; Portland Gas Light Company, Maine.

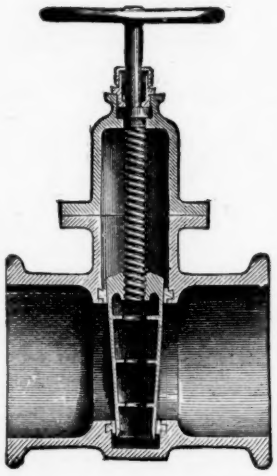
. Reference to them is requested. 904-1y

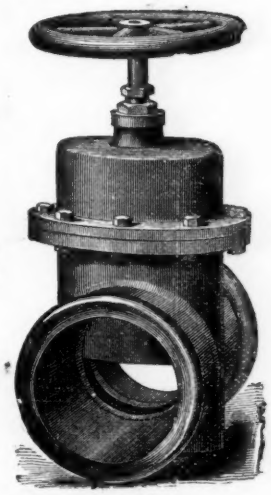
CHAPMAN VALVE MANUFACTURING CO.

MANUFACTURERS OF

CHAPMAN GAS VALVES.

Office and Sales Room 75 and 77 Kilby Street, Boston.





These Valves have been in use for several years, and are pronounced by all who have used them to be

The Best Gas Valves Ever Made.

They afford a direct passage the full size of the pipe. The seats are made of an alloy similar to BABBITT metal, specially prepared for the purpose, and superior to all other metals used for the seats of Gas Valves. It does not corrode under any circumstances to which it is exposed.

There is no LIABILITY OF COHESION between the Gate and Seat, and the Valves can be relied upon to SHUT TIGHT and OPEN EASILY at all times—an important desideratum when used for street mains, in cases of fire.

We refer to the following named Gas-Light Companies among the many that have used these Valves:

BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CAMBRIDGE GAS-LIGHT COMPANY, CAMBRIDGE, MASS.
NEWTON & WATERTOWN GAS-LIGHT CO., WATERTOWN, MASS.
LAWRENCE GAS-LIGHT COMPANY, LAWRENCE, MASS.
PEOPLES GAS-LIGHT COMPANY, BROOKLYN, N. Y.
CITIZENS GAS-LIGHT COMPANY, BROOKLYN, N. Y.
SOUTH BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CHARLESTOWN GAS-LIGHT CO., CHARLESTOWN, MASS.
LYNN GAS-LIGHT COMPANY, LYNN, MASS.
FITCHBURG GAS-LIGHT COMPANY, FITCHBURG, MASS.
CITIZENS GAS-LIGHT COMPANY, NEWARK, N. J.
WILLIAMSBURGH GAS-LIGHT CO., WIRLIAMSBURGH, N. Y.

GAS AND WATER VALVES ½ INCH TO 36 INCHES DIAMETER.

STEAM VALVES ½ INCH TO 12 INCHES DIAMETER.

357-tf

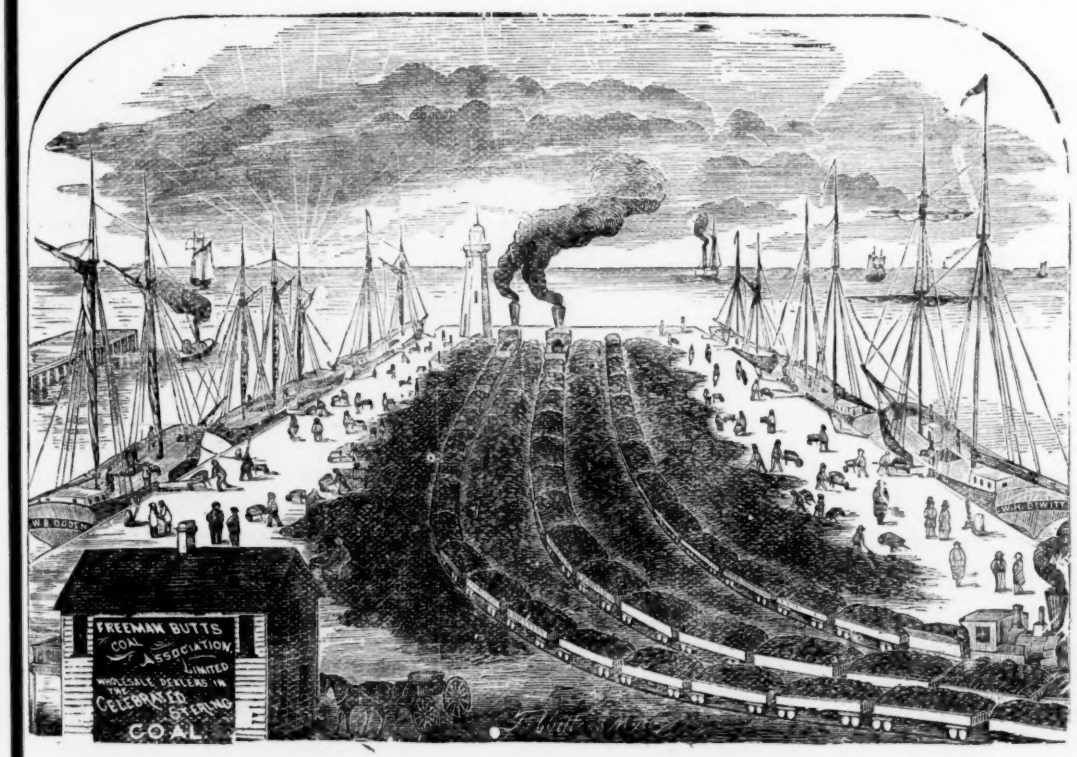
FREEMAN BUTTS COAL ASSOCIATION,

(LIMITED.)

CLEVELAND, OHIO,

CELEBRATED GENUINE STERLING COAL.

American Cannel, Pittsburg and other Gas Coals.



Testimonials.

From Manhattan Gas-Light Co., N. Y.

Yours of the 9th inst. is received. The "Sterling Coal" received from you during the past year worked very satisfactory—averaging 9,500 cubic feet of 15 candle gas per ton of 2,240 lbs., and 41 bushels of coke weighing 1465 lbs. We consider it among the best American Gas Coals for the quantity and quality of the gas produced, and also for the excellent quality of the coke.

I am, gentlemen, your obedient servant,

CHARLES ROOME, Pres't.

From Buffalo Gas-Light Co., Buffalo, N. Y.

The Sterling Coal we have had from you we find to be an excellent gas coal. The yield of both gas and coke is good. The illuminating power of the gas is high and the quality of the coke is very good.

ROBERT ROBSON, Foreman Gas Works.

From Citizens Gas-Light Co.

ROCHESTER, N. Y., Sept. 2, 1874.

Your favor September 2nd at hand. Yield Sterling Coal to date from July 19, 4·70.

Respectfully yours,

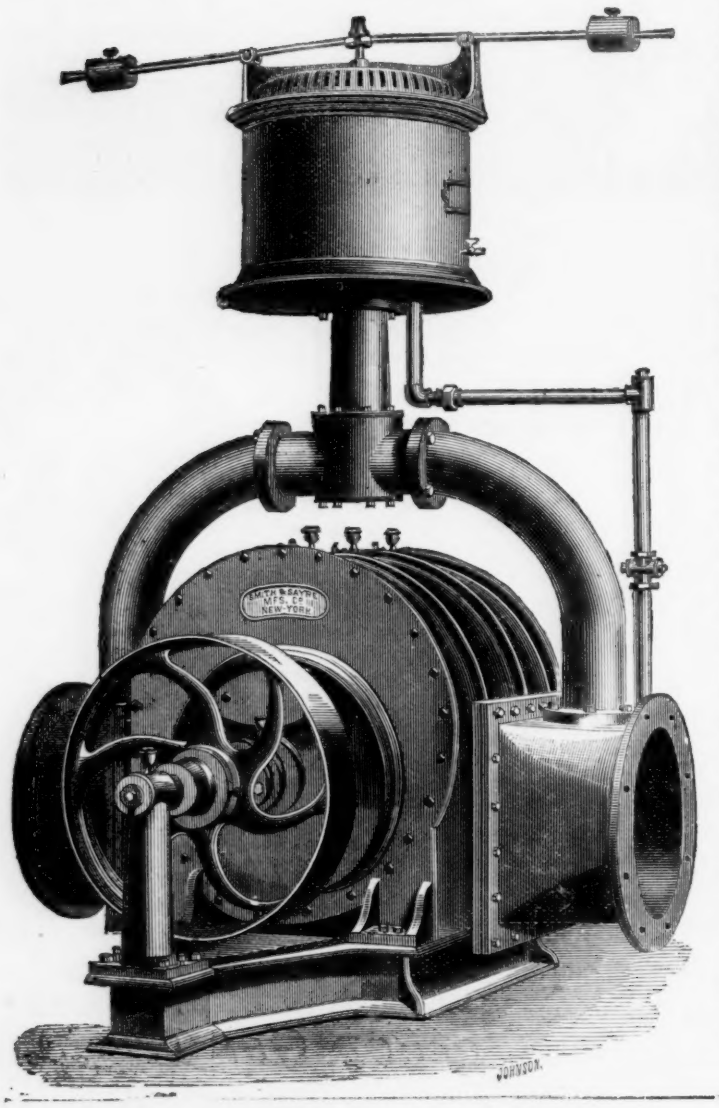
WM. H. WARD, Sec.

Would also refer to the Gas Companies in the following places: New York City (Manhatran and New York Cos), Brooklyn, Albany, Troy, West Troy, Buffalo, Rochester, Oswego, Ogdensburg, Lansingburgh, Newburgh, Rome, Palmyra, Geneva, Yonkers, Rondout, Kingston, Albion, Brockport, Seneca Falls, Elmira and Lyons in State of New York; Cleveland, Toledo, Sandusky, Norwalk, Oberlin, Salem and Fremont in Ohio; Detroit, Ann Arbor, Grand Rapids, Kalamazoo, Jackson and Adrian, in Michigan; Toronto, Hamilton and Coburg in Canada; Chicago, Ill., and two companies in Milwaukee, Wis.

SMITH & SAYRE MANUFACTURING COMPANY.

The Mackenzie Patent Gas Exhauster

And Patent Compensator.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-jo ints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary fan.

The Cupolas are manufactured in sizes to melt from 1 to 20 tons per hour, will save one quarter of the time required by the old style Cupola and 33 per cent fuel. Address

G. G. PORTER, President.

OFFICE, 95 LIBERTY STREET, New York.

JAMES M. SAYRE, Treasurer.

[CHARLES W. ISBELL, Secretary.

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

MAY 16, 1875.

DELIVERED IN NEW YORK.

English Cannel.			
Ince Hall	$17 00	@	18 00
Kirkless Hall	16 50	@	17 00
English Caking Coals.			
Newcastle Gas	$12 00	@	00 00
Liverpool caking	11 50	@	12 00
British Province Coals.			
Pictou	2 50		
Block House—At Mines, $2 12, Gold	0 00		
Caledonia—At Mines, $2 00, Gold	0 00		
Little Glace Bay—At Mines, 1 87½, Gold	2 00		
Lingan—At Mines, $2 25, Gold	0 00		
Sydney—Old Mine	3 00		
" Reserve Mine	2 2		
" International	— —		

(Duty, 75 cents per ton, gold. Freight to New York $2 25 currency. Cost of above coals delivered in New York, $5 25 @ $6 00½, currency.)

Pennsylvania Coals.			
Penn Gas Coal—At Amooy	$7 00	@	0 00
Westmoreland—At Amboy	7 00	@	0 00
(In New York both the above coals $7 50)			
Shafton	7 50	@	0 00
Youghiogheny	7 75	@	0 00
West Virginia Coals.			
MurphyRun	$7 40	@	0 00
Despard	7 40	@	0 00
West Fairmont	7 40	@	0 00
American Gas Coal	7 40	@	0 00
Fairmont	7 40	@	0 00
Newburgh Orrel	7 40	@	0 00
Pinnickinick	7 40	@	0 00
Cloverhill of Virginia	6 00	@	6 50
McKenzie Compound Mixture			— —
American Cannel Coals.			
Peytona of West Virginia	$12 50	@	00 00
Darlington of Pennsylvania			— —
Cannelton Cannel			12 50
Red Bank—at Philadelphia			7 60
" —at South Amboy			9 00
Asphalts.			
Albertite of New Brunswick	$— 00	@	— 00
Ritchie Mineral of West Virginia	18 00	at Balt'e.	
Trinidad Bitumen	— —	@	14 05

The Waverly Coal and Coke Company of Pittsburgh, have contracted with the Pittsburgh Gas-Light Co. for 40,000 tons of their Youghiogheny coal, oh private terms,

SLADE'S
AUTOMATIC FIRE GOVERNOR.

PATENTED AUGUST 4, 1874.

It regulates the speed of Exhausters by controlling the fire. The least pressure on the Retorts opens the Damper in the Boiler Chimney and under the fire, and closes them as soon as the pressure is removed. Saves the boiler, fuel, and all attention, except to supply the fire. Come and see it, or address

JAMES SLADE,
Gas Works, Yonkers, N. Y.

Gas Engineers,

AND PARTIES ENGAGED IN THE BUILDING OF

GAS WORKS,

who desire information regarding PETROLEUM GAS, either or use pure, or for enriching, are requested to address, sta ing particulars.

J. D. PATTON,
363-un1 Treverton, Northumberland Co. Pa.

To the Profession.

A YOUNG MAN OF LIBERAL EDUCATION, WHO HAS spent many years in the study of gas, and working in a arge gas works, desires a situation as Superintendent of a works making 10,000 to 50,000 cubic feet daily. Has good reference as to ability; or would act as Assistant in large works. Would prefer a situation on the staff of a gas works uilder—draws well, and has experience in setting up appar-

Address, stating salary, C. P. V., care of W. B. CAR- & Co., Cincinnati, Ohio. 372

P.P. DEILY, J. FOWLER.

1842. *1874.*

DEILY & FOWLER,

39 LAUREL STREET, PHILADELPHIA, PA.,

Builders of Gas Works.

MANUFACTURERS OF

GAS-HOLDERS,

Single and Telescopic.

WROUGHT IRON ROOF FRAMES,
COAL WAGONS,
COKE BARROWS,
AND ALL

Wrought Iron Work

CONNECTED WITH GAS WORKS.

☞ Particular attention paid to Extensions and Repairs.

MASSACHUSETTS
INSTITUTE OF TECHNOLOGY.

Entrance Examinations June 1 and 2, and Sept 23 and 24. For new Catalogue and late Entrance Examination Papers apply to

PROF. SAMUEL KNEELAND,
255-12t Secretary, Boston, Mass.

MECHANICAL & GAS ENGINEER.

To Gas-Light Co's.

The undersigned respectfully announces his voluntary resignation of the Vice-Presidency of the American Meter Company, from the 1st of March last, after filling that position from its organization in 1863, and now offers his services as

Consulting or Constructing Engineer,

in the erection of new, or the extension of Gas Works.

He is prepared to furnish plans and Specifications, embracing all the latest improvements in the MANUFACTURE OF COAL GAS, at short notice, and on reasonable terms. His experience of THIRTY YEARS in the construction of Gas and Water Works, Railroads, Tunneling, etc., enables him to refer with confidence to any of the Works erected by him, as a guarantee of satisfaction and ability.

By arrangements with reliable manufacturers of all MATERIAL and SUPPLIES used by Gas Companies, he is prepared to furnish promptly all such orders, with best selections, and to give satisfaction as to prices, terms, etc., and respectfully solicits a share of patronage.

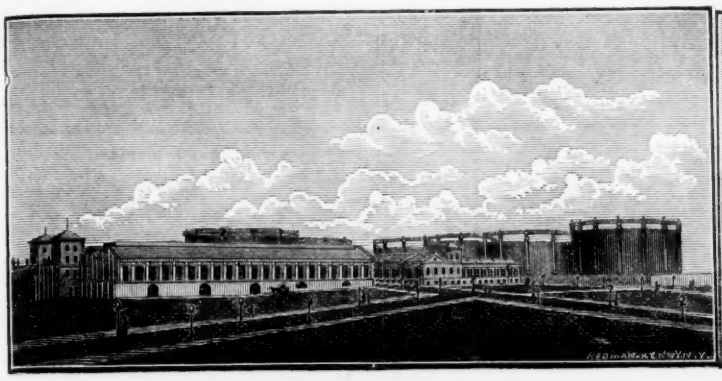
HENRY CARTWRIGHT, Gas Engineer,
2107 GREEN STREET, PHILADELPHIA. 379-6t

KIDD'S
Gas Consumers' Guide

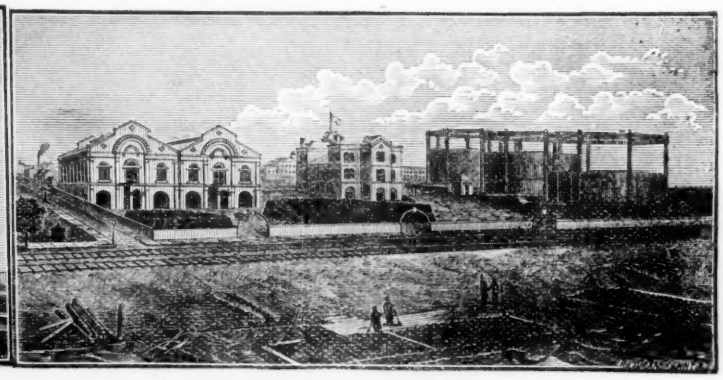
Enables every Gas Consumer to ascertain at a glance, without any previous knowledge of the Gas Meter, the quantity and money value of the Gas consumed. Also the best method of obtaining from Gas the largest amount of its light.

It will be to the advantage of Gas Companies to supply their Consumers with one of these Guides, as a means of preventing complaints arising from their want of knowledge in regard to the registration of their meters. For sale by

A. M. CALLENDER & CO.,
42 Pine Street, New York, Room 13,



CINCINNATI GAS WORKS. ERECTED 1871-72-73.—WM FARMER, ENG.



LACLEDE GAS WORKS, ERECTED 1872.—WM. FARMER, ENG

WILLIAM FARMER,

ARCHITECT AND GENERAL GAS ENGINEER,

111 BROADWAY, TRINITY BUILDING, Room 95, New York.

WILLIAM FARMER may be consulted upon all matters connected with the construction of GAS WORKS, or any other description of buildings Will furnish General and Detail Drawings, Specifications and Estimates for Gas Works of any capacity.

PATENTEE OF THE FOLLOWING INVENTIONS:

Exhausters for Gas and Foul Lime Ventilation,
Dumping Barrows for Coal, Coke and Lime,
Hydraulic Mains for Retort Benches,
Blowers for Forges, Foundries, &c.
Pumps for Water, &c., &c.

REFERENCES:

Professor SILLIMAN, New Haven, Conn.
GEN. CHAS. ROOME, President Manhattan Gas-Light Company, N. Y.
A. W. BENSON, President Brooklyn Gas-Light Company, Brooklyn, N. Y.
W. W. SCARBOROUGH, President Cincinnati Gas-Light Company, Cincinnati, Ohio.
S. L. HUSTED, President Laclede Gas-Light Company, St. Louis, Mo.
Prof. HENRY WURTZ, Editor AMERICAN GAS-LIGHT JOURNAL, N. Y.
GEN. A. HICKENLOOPER, Vice-President Cincinnati Gas-Light Co., Cincinnati, Ohio
FREDERICK CROMWELL, Vice-President Laclede Gas-Light Company, St. Louis Mo.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal.

PATENT FOR SALE.

To Fire Clay Retort Manufacturers.

W. D. CLIFF, of the firm of JOSEPH CLIFF & SON, Wortley, Leeds, England, has recently obtained Letters Patent for the making of CLAY RETORTS by machinery. Besides being made cheaper, they are also made much better than by hand. They are regular and equal in their thickness, and in their length are true and straight throughout, being in all respects far better and handsomer than hand made Retorts. The fact that Messrs. Cliff & Son have for many years been very largely engaged in the making of Clay Retorts will be a sufficient guarantee as to value of the patents. The patentee is wishful to sell the patent right for America. It is No. 55,069, and is for seventeen years from the 15th day of September, 1874.

All particulars may be learned on application to

W. D. CLIFF,
Wortley, near Leeds, England.

580–6t

B. S. BENSON.

MANUFACTURER OF

Cast Iron Pipes and Fittings,

AND

Gas and Water Mains.

All sizes from 3 to 30 inch cast vertically in 12½ feet lengths

Office & Factory 52 East Monument St.,
BALTIMORE, MD.

$30 per Dozen.

DEAN'S

NEW PATENT (1873)

Screening Scoop SHOVEL

FOR COKE, COAL, ASHES, AND OTHER SUBSTANCES.

The frames are 12 by 18 inches, with seven bars, and are made of the best malleable Iron. They can be wired between bars by an arrangement of holes a quarter of an inch apart, by an ordinary person, to screen any size substance desired. They are warranted to be the most durable and practical Screening Shovel made, or money refunded.

Reference—All New York Gas Companies and Hotels.

Price, $30 per Dozen.

Sample sent gratis to any Company, if desired.

☞ Smaller sizes on hand. Please address orders to A. SEE & SON,
N. Y. Shovel Works, No. 1358 B'way, N. Y

FOR SALE.

On or about May 1st, 1875,

One 8 Ft. STATION METER

complete, of American Meter Company's make, with a capacity of four hundred thousand cubic feet per day.

For price and any other information address

H. STACEY, Eng'r and Sup't
Indianapolis Gas-Light and Coke Co.,
Indianapolis, Ind.

375–6t

JESSE W STARR & SONS,

Camden Iron Works

Camden, New Jersey,

MANUFACTURERS OF

ALL KINDS OF CASTINGS AND APPARATUS FOR GAS WORKS,

Wrought Iron Roof Frames,

For Retort and other houses Retorts and all castings required for setting them in the latest and most improved model. WASHERS, CONDENSERS, SCRUBBERS and EXHAUSTERS for relieving the Retorts from pressure. PURIFIERS, varying from 2,000 to 2,000,000 cubic feet daily purifying capacity.

Wrought Iron Lime Sieves

for Purifiers. Station Meters of all sizes.

GAS HOLDERS,

TELESCOPIC AND SINGLE,

With cast iron guide and suspension frames. GASERNORS or REGULATORS, STREET MAINS, from 1½ 48 INCHES DIAMETER, for WATER or GAS. Street Main connections, such as BRANCHES, BENDS, DRIPS, SIEVES, etc.

STOP VALVES, from 3 to 30 inches, for both Water and Gas.

Wrought Iron Work.

All the Smith and Sheet Iron work required in and about Gas Works. 226-tf

JESSE W. STARR. BENJ. A. STARR. BENJ. F. ARCHER

B. E. CHOLLAR,

GAS ENGINEER,

914 OLIVE STREET, ST. LOUIS, MO.

355–

THE

PENN GAS COAL COMPANY

OFFER THEIR

COAL, CAREFULLY SCREENED,

AND PREPARED FOR

GAS PURPOSES.

Their Property is located in the Youghiogheny Coal Basin, near Irwin's and Penn Station in the Pennsylvania Railroad, and on the Youghiogheny River.

OFFICES

No. 11 Merchants Exchange, Phil'a. 90 Wall Street, New York.

PLACES OF SHIPMENT.

Pennsylvania Railroad, Pier No. 2 (Lower Side).
Greenwich Wharves, Delaware River.
366-1y **Pier No. 1 (Lower Side), South Amboy, N. J.**

CANNELTON COAL COMPANY,
OF WEST VIRGINIA.

Offer for sale the following Coals, from their Colliery at CANNELTON, Kanawha County, West Virginia, delivered at RICHMOND, Va.:

CANNELTON CANNEL,

acknowledged to be the most valuable ENRICHER produced in this country, a gross ton yielding 10,000 cubic feet of GAS of 64·54 CANDLE POWER; COKE 32 bushels, of good quality.

CANNELTON SPLINT,

a SEMI-CANNEL of an excellent quality, a gross ton producing 9,500 cubic feet of Gas of 20 CANDLE POWER; COKE, 30 Bushels, fair quality.

CANNELTON CAKING COAL.

Recent experiments made with this Coal have established the fact that the Kanawha Valley can furnish GAS COAL equal to those produced from any other section of the country; that mined by the Cannelton Co. yielding from the gross ton 10,000 cubic feet of Gas of 16 CANDL EPOWER; 35 bushels of COKE of *superior quality*—only *one* per cent. of *sulphur*.

SAMPLE CARGOES shipped to any required point, on application to the undersigned, from whom full information can be obtained.

SALES AGENTS — J. TATNALL LEA, Treasurer, P. O. Box 1747 Philadelphia.
(PERKINS & JOB, 27 South Street, N. Y.; 91 State Street, Boston.
(H. W. BENEDICT & SON, New Haven.

ARCHER & PANCOAST MAN'G CO.

DESIGNERS AND MANUFACTURERS OF ARTISTIC

GAS FIXTURES,

AND IMPORTERS OF

FRENCH BRONZES & CRYSTAL CHANDELIERS.

67 Greene Street, 68, 70, 72 Wooster St. } Above Broome. **New York.**

RILEY A. BRICK & CO.,
MANUFACTURERS OF

CAST IRON PIPES,

FOR WATER AND GAS,

ALSO,

GAS WORKS AND MACHINERY CASTINGS
OF EVERY DESCRIPTION,

No. 112 Leonard Street, New York.
RILEY A. BRICK. JAS L. ROBERTSON

TYRCONNELL GAS COAL.,

MINED IN TAYLOR COUNTY, WEST VA.

Company's Office, 52 S. Gay St., Baltimore.
CHARLES MACKALL, Secretary.
CHARLES W. HAYS, Agent, Room 7, 111 B'way, N. Y.
SHIPPING POINT—Baltimore, Md.

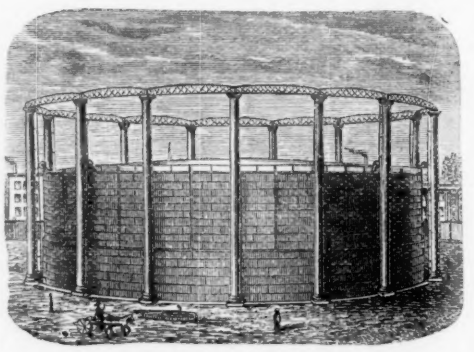
This coal yields 10,000 cubic feet of Gas, with an illuminating power of over 16 candles. Forty bushels of very superio Coke, with little Ash, and scarcely any clinker. 304-1y

T. F. ROWLAND,

Continental Works,

GREENPOINT, BROOKLYN, N. Y.

ENGINEER, AND MANUFACTURERS OF



GAS-HOLDERS

OF ANY MAGNITUDE,

Condensers, Scrubbers, Purifiers, Retorts, Hydraulic Mains, and all other articles connected with the Manufacture and Distribution of Gas, furnished with despatch. Plans and Specifications prepared, and Proposals given for the necessary Plans for Lighting Cities, Towns, Mansions, and Manufactories.

MONONGAHELA
GAS COAL COMP'Y
Of West Virginia.

OFFICE, 56 EXCHANGE PLACE.
(P. O. Box 432.)
BALTIMORE.

Thomas Gemmell, *President.*
A. Robinson, *Vice President and Treasurer.*
Benjamin Bissell, *Secretary.*

Mines at Wilsonburg, Harrison Co., W. Va
Shipping Port, Baltimore.

L. S. BOYER & CO., GENERAL SALES AGENTS.

The result of use of this coal in *quantity* by several of the largest gas works in the country, is reported as follows, viz. Yield of gas, 10,000 to 10,500 feet per ton of 2,240 lbs.; illuminating power, 16½ to 17½ standard candles; coke, good in quantity and quality. 350-3m

THE NEWBURGH

Orrel Coal Company,

Mines at Newburg, Preston County, W. Va.
Company's Office, No. 52 S. Gay Street, Baltimore, Md.
C. OLIVER O'DONNELL, Pres't. CHAS. MACKALL, Sec'y.
CHAS. W. HAYS, Agent in New York, Room 7, Trinity Building, 111 Broadway.
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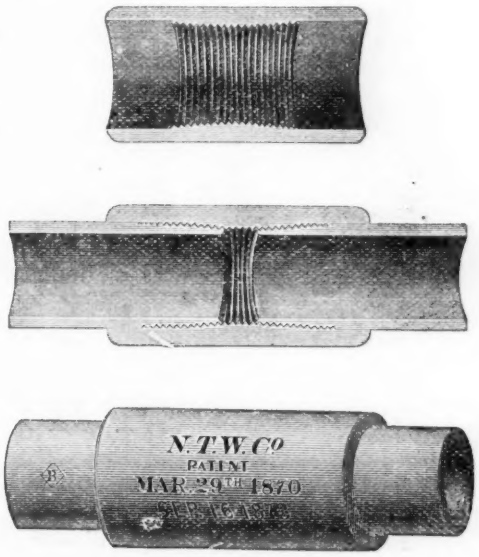

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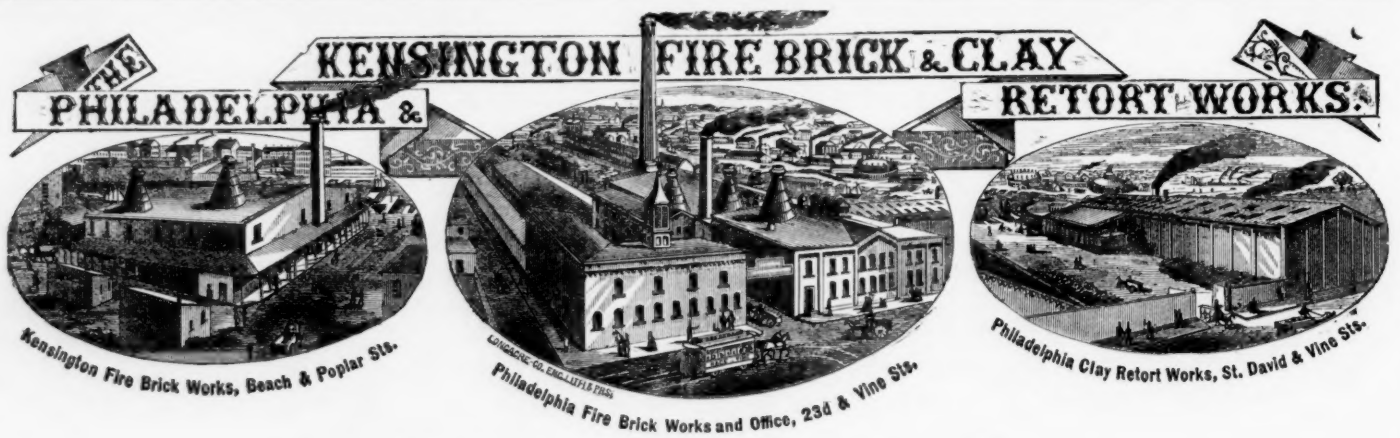
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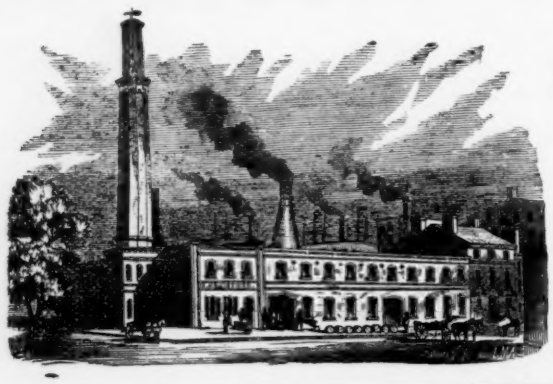

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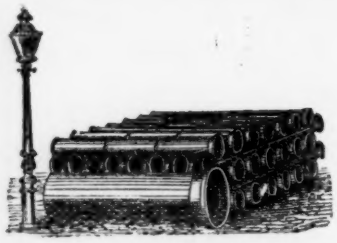

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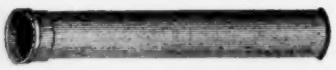

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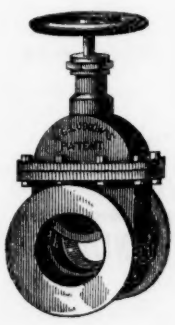

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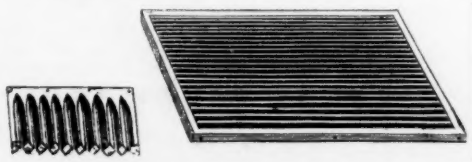

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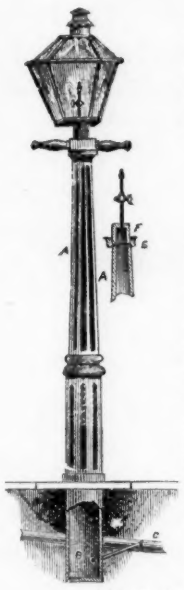

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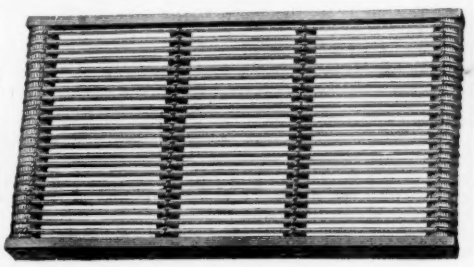

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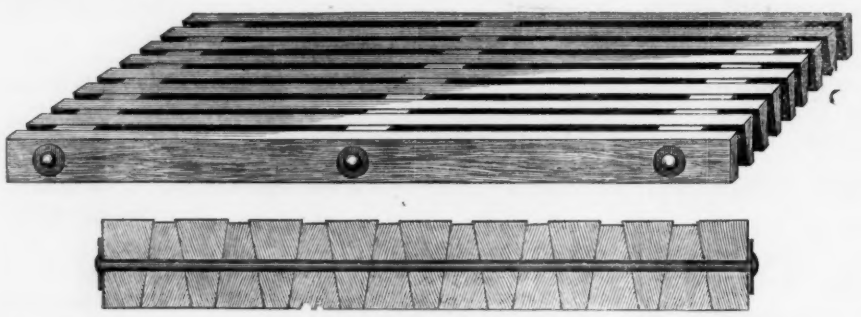

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